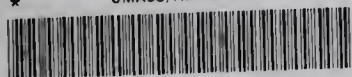


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FRUIT NOTES

JULY 1935 - NOVEMBER 1949

Extension Service
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FRUIT NOTES

1936 - 1949 (inclusive)

(Compiled by W. H. Thies, Extension Horticulturist)

Since 1936, this periodical has been issued by the Extension Service as a means of informing Massachusetts fruit growers on matter of current interest. Both tree fruits and small fruits have been included. The first mimeographed issue in March, 1936 was preceded by carbon copies of similar material mailed from time to time to the County Extension offices. (Two of these releases, July and August 1935, are here included).

It has been our purpose through the years to cover a wide variety of items and to have the write-ups relatively brief. Considerable attention has been given to abstracting Experiment Station reports and to the presentation of timely information. A casual survey of this material, month by month, will provide the reader with a running account of the various problems confronting the fruit grower in years past and the suggested solutions.

For various reasons, there are quite a number of missing issues in this bound volume. In several of the months no issue was prepared. In others, a demand for the extra copies exhausted the supply. The missing issues are as follows:

1936 (Jan., Feb., March, April, July, Aug., Nov., Dec.);
1937 (Aug., Sept., Oct.); 1939 (Oct.); 1943 (Aug.); 1946 (Feb., Nov.); 1947 (Jan., May, June, Sept.); 1948 (Jan., Mar., May, Sept.);
1949 (Jan., ~~Feb.~~, June, Sept, Dec.,).

FRUIT NOTES - July, 1938

W. H. Thies
Extension Horticulturist

Promising Newcomers

Among the talked-of new varieties of strawberries are Dorsett, Fairfax, and Catskill. In comparing the Dorsett and Fairfax as grown at the State College, A. P. French says they are of very good quality and are above average in size. The Dorsett is a somewhat better plant maker and the berry is more attractive than the Fairfax. It is also more regular in form. The yields under our conditions are not yet known but it is doubtful if they will compare with the Howard 17. Both varieties appear to be firm enough for shipment. The Fairfax may be a little too dark in color, a fault sometimes found with the Howard Supreme. It is also less acid than the Dorsett and seems to have a little less of real quality. Both are good berries and deserve further trial in Massachusetts.

Fifty Years to Make Good

The late W. T. Macoun of Canada once stated at a Canadian fruit meeting that it takes at least 50 years to determine the merits of an apple variety. 50 years seems like a long time, but if we analyze the situation, this estimate is not unreasonable. On the average, 15 years is required from the date of crossing until the possibilities of a seedling are realized. 15 more years are required for propagation and a second test under various climatic and soil conditions, and 15 or 20 more years for a general trial. Then, after a century or two a real winter may appear and give us the true test of the variety.

Cortland, a mere youth, is 36 years old. Within 14 years it will either have made its mark or it will have passed into oblivion. Kendall is an infant, 22 years old, and practically nothing is known as to how it will perform away from home. And so the experiment station worker is compelled to fall back upon such stock phrases as, "the variety seems worthy of trial," or "it looks promising."

Give the Crafts a Chance

To let scions grow indefinitely without any training at all is a mistake, but not as serious as it is to prune a grafted tree too strenuously. Many an otherwise promising scion has failed because of too much competition around it. Others are handicapped from the beginning because of being grafted into a secondary limb instead of a main limb. In order to insure good growth the first season, it is well to go through during early summer and cut out some of the shading suckers which handicap the

scion. But not all of this adjacent growth should be removed. A few such growths help to protect the scions from the wind. They also tend to keep the stub in a healthy condition. It is an excellent thing to have plenty of leaf area below and around the scion, but the scion should dominate. It is also well at this season to make sure that new grafts are properly waxed for in spite of a rainy June we may have a dry August.

Does It Pay to Pick Up "Drops?"

The answer is "Yes," if the drops contain larvae of curculio, codling moth or maggot, if you pick them promptly. The old practice of going out in the fall and gathering up all of the apples on the ground and dumping them in a convenient fence corner is a waste of time to say the least.

If one is interested in controlling curculio by the crop picking method, it is obvious that the drops must be picked up while the grubs are still inside. According to W. D. Whitcomb, the curculio grubs may be killed by picking up and destroying drop apples from June 25 to July 10. Drops should be gathered each week, if possible, but a collection about July 4 is most important. If drops cannot be gathered under all trees they should be collected under the most heavily infested trees. Grubs may be killed by feeding the apples to livestock, treating them with waste crankcase oil, or burying the apples under 18 inches of packed soil. The question of proper disposal of apples removed at thinning time depends, of course, on what the apples may have in them. If it is suspected that they contain an appreciable number of eggs or larvae, it will be worthwhile to treat them accordingly.

The value of picking up maggot infested drop apples has been proven many times. Here it is essential that one begin before any of the maggots emerge from the apples. They should be gathered up regularly and thoroughly about twice a week. The destruction of drops from trees of summer and fall varieties is of much more importance than from winter varieties. A few maggot infested Wealthies or Gravensteins will furnish plenty of flies for next summer unless the drops are properly disposed of. For apple maggot control it should not be necessary to begin picking up drops until July 20.

Timing Tells the Story

Several samples of curculio scarred apples have come to the State College recently along with an inquiry which might be summarized by the words "How come?" At least two individuals stated that they had sprayed according to the recommended schedule. Making allowance for the difficulties involved in preventing curculio blemishes where beetles are numerous, we are convinced that much of the trouble comes from spraying after the damage is done

or from a scanty coverage of the arsenical spray. A spray intended for protection against curculio, but applied a week late, is about as efficient as a fire engine arriving after the fire is out.

Another example of this same thing is found in McIntosh orchards where no Pink spray was applied this year. Leaves of a particular size, showing that they were developed before bloom, are in some cases literally plastered with scab. But where the trees were given protection at that time, and since, scab is conspicuous by its absence.

Lime for Spraying Purposes

It is becoming increasingly evident that "any old lime" will not do in the spray tank. According to O. C. Boyd, the right kind of lime has real value, the wrong kind little or none. The term chemical hydrated lime has been used for years to designate a lime with the highest possible amount of calcium hydroxide and the lowest possible amount of ordinary impurities like magnesium, iron, aluminum, etc. Such a lime must of necessity be made from a limestone high in calcium carbonate. Careful and complete slaking of the burned lime is necessary in order to insure proper texture, fineness, and calcium hydroxide content. This product will contain not less than 70% calcium oxide in the form of calcium hydroxide. Pure calcium hydroxide contains about 76% calcium oxide. Hence a chemical hydrated lime will of necessity contain only a very small amount of impurities and a maximum amount of the desirable ingredient, calcium hydroxide.

When a lime of high magnesium content is placed in the spray tank along with lime sulfur and lead arsenate, the magnesium hydroxide acts as an inert material. It apparently fails to reduce the chemical action between lime sulfur and lead arsenate and it also fails to reduce the water soluble arsenic and thereby fails to furnish protection to the foliage. The principal objection to magnesium in spray lime is that its presence automatically reduces the amount of the effective ingredient, calcium hydroxide, and not as some have been led to believe, because of injurious magnesium compounds formed. Incidentally, if the chemical hydrated lime is not fresh, enough of the lime will have changed to the carbonate form to greatly reduce its effectiveness in the spray tank.

Signs of Starvation

A few days ago J. K. Shaw of the State College was asked to look over an orchard which for some unaccountable reason had borne only a light crop last year and a still smaller crop this year. The orchard had been fertilized rather liberally until about 1929. Since then it has been pruned but has received little or no fertilizer because the grower felt that he had been growing too much wood. He doubted the wisdom of applying manure only to pro-

duce more wood for the pruning saw. Today the leaves on many of the trees have a yellowish tinge and this one thing is obvious. This orchard is a fairly good example of the present day conviction that growth and tree vigor go hand in hand with productiveness. Without an ample supply of nitrogen, yields are certain to be disappointing.

A Glimpse of the Pre-Experiment Station Era

50 years ago there was a dearth of information among farmers about matters which today are common knowledge. In the absence of fundamental information their conclusions were sometimes a little off. At a meeting of fruit growers in South Haven, Michigan, in 1874, the question of blight of apple trees was under discussion. One grower voiced an opinion that there were two species of apple blight, one caused by insects and the other not. And for the blight not caused by insects he would recommend the use of salt sprinkled on the ground under the tree as a preventive. He went on to say that in New Hampshire they used salt seaweed as a mulch for their trees with great benefit. Another grower reported finding a small worm at the end of the blighted twig. After such discussion the group came to this conclusion. "The probabilities are that an insect lays its egg in the terminal bud early in the spring, which hatches out and eats the pith during the growth of the shoot. The worm in coming out of the limb, lets the air into the cavity, causes it to discolor, thus checking the circulation of sap, which on bright, clear, warm days causes the limb to blight."

Unsolved problems of this kind resulted in the establishment of Experiment Stations throughout the country. Today we can turn to the findings of the research worker and therefore have less need to philosophize than did the grower of the 70's. Incidentally, at the above meeting it is reported that Master L. H. Bailey showed a jar of fall webworm on an apple twig. The Liberty Hyde Bailey whom we respect and admire was then a lad in grammar school.

A Grape Vine at Its Best

Grape insects, with the exception of an occasional infestation of plum moth or of rose chafer, are seldom sufficiently numerous to greatly reduce the crop. In Massachusetts, a well grown vine will ordinarily produce a crop provided black rot is controlled. Often a fair crop is produced with no spraying at all. The rose chafer is fairly abundant around Amherst this season. On a small scale hand picking of the beetles is recommended. Bordeaux Mixture serves to repel them, while a combination of lead arsenate and molasses is apparently more effective than lead arsenate alone. The grape vine flea beetle does some damage to the vine but may be quite easily controlled by the recommended materials, Bordeaux mixture and lead arsenate. Where grape leaf hopper is present, nicotine should be added to the spray. One serious infestation

of grape plume moth has been reported this year. The larvae were sufficiently numerous to cause a webbing of practically all of the shoot tips. In general, it should not be necessary to spray grape vines more than three times in Massachusetts. Pruning is of greater importance to the welfare of the average vine, than spraying.

Raspberry Insects not a Serious Problem

Raspberry insects cause much less trouble to plantings in Massachusetts than do the virus diseases. Insects, therefore, seldom require much special attention. Three insects quite commonly found are the cane borer, the raspberry beetle (*Byturus*), and the tree cricket. The latter is relatively unimportant, although canes are occasionally scarred where the insect inserts its eggs. The *Byturus* beetle is a small, slightly hairy, light brown beetle about 1/7 inch in length. It appears in May and begins feeding on the buds and the leaves and later attacks the blossoms. This pest may also attack blackberries. Control is fairly easy if the canes are sprayed with lead arsenate as the first beetles appear. The cane borer results in the dying of the young tip beyond the point where two circular incisions are made. Cutting off and destroying these tips is quite effective. A few days ago a portion of a blackberry plant was mailed into the State College showing a serious infestation of *Lecanium* scale. This pest occasionally attacks peach trees but is not common on the bramble.

FRUIT NOTES - August, 1935

W. H. Thies
Extension Horticulturist

Which Varieties of Peaches Shall We Plant?

Speaking on this subject before a group of Connecticut fruit growers, A. J. Farley of New Jersey says we have more good new varieties to replace Carmen and other early peaches than we have to replace Elberta. For New Jersey he recommends the following: Before mid-August - Cumberland and Golden Jubilee. Carmen Season - Several numbered varieties. Hiley Season - Eclipse, N. J. 87. Belle Season - N. J. 94. A series of good, yellow, freestone peaches is now available starting with Colden Jubilee, and ending with Elberta. Professor Farley believes the New England grower will do well to grow varieties earlier than Elberta because the consumer has had enough southern peaches of that variety, only partially mature, by the time our Elbertas are ready to harvest.

An attempt should be made to reduce our list of peach varieties. There are so many new varieties being propagated, and leaf identification is so troublesome as to make as much difficulty with misnamed peaches in the future as we have had with apples in the past. Golden Jubilee, for example, is being wrongly described in some catalogs. Cumberland and Pioneer are now mixed in the nursery. They are easily distinguishable only when in bloom. The former has a large blossom and the latter a small one. At least two different varieties have been sold as South Haven.

We can't expect any peach variety to stand a temperature of 20° to 25°. No varieties came through with a crop in New Jersey last winter. Many of our new varieties contain Elberta or Hale blood and so are no more hardy than the parent varieties. An immense number of peach pits have been planted by nurserymen. This means that there will be plenty of peach trees available in the spring of 1937, although the supply next spring will be rather short.

New Developments in Growing Small Fruits

In Oregon, according to C. F. Darrow of the U.S.D.A., strawberries have been severely injured by a sudden drop in temperature in the fall, while a gradual decline in temperature resulted in hardening so that no injury resulted. It was also found that plants growing on a wet soil were more subject to winter injury than plants on a drier soil. Early mulching (by November 12) in Wisconsin resulted in a heavy yield the next season, but late mulching (by December 10), resulted in a

a serious reduction in yield. The injury was attributed to a temperature of 7° F. on November 19.

Several workers in Canada, Ohio, Maryland, and North Carolina have noted that the older runner plants (those rooted in mid-summer) produce more fruit than later runner plants, (those rooted in September and October). Recent experiments in North Carolina show that when grown in a spaced row the individual plants produce far more fruit per plant and that yields per acre are also greater. Such spaced plants were larger and had more leaves in the fall when fruit buds were forming. Plants with two leaves in the fall formed small fruit buds and bore few berries. The greater the number of leaves in the fall the greater the amount of fruit the following spring. The grower should therefore aim to produce the largest individual plants in the fall by early rooting of runners, removing late runners, and by proper spacing of plants.

Recent work in the U.S.D.A. shows that the Blakemore, Missionary, and Klondike are adapted to southern regions because they can grow vigorously during the short days of early spring while the Howard 17 and other northern varieties require the long days of midsummer to succeed. Varieties like Dorsett form so many runner plants unless attended to, that the plants are too crowded to set much fruit. Control of runner plant production is essential on Dorsett, Fairfax, and Catskill.

Can Apple Trees be Made to Bear Annually?

If it were possible to thin blossoms economically there would be little question about annual crop of apples even on biennial bearing varieties. But thinning of blossoms is not feasible commercially. Early thinning of fruits, however, may be worth the cost even though rather expensive. There is evidence to show that thinning within two or three weeks of petal fall will help to overcome the biennial tendency.

In discussing biennial bearing at a recent F. and H. Week meeting, G. F. Potter of New Hampshire referred to a grower in Washington who, after observing a light set of Anjou pears in spite of a heavy bloom decided to experiment with his apple trees. He inflicted the Anjou habit of set on his biennial bearing Newtown and Ortley apples by a system of hand thinning of the blossoms. The result was a crop of apples the next season. In a test near Hancock, Maryland, where side differences in vigor of growth in mature York trees had been induced by means of pruning and fertilizing, no differences in regularity of bearing were observed until a frost thinned out the bloom and reduced the set. Then annual bearing occurred on all plots.

A Fruit Tree in a Lawn

A thrifty peach tree growing without cultivation is of uncommon occurrence except where the grass is clipped regularly and left lay around the tree. In fact, vigorous fruit trees in lawns are the rule rather than the exception. Nitrogen in young grass seems to be in a rather readily available form and capable of being washed back into the soil. A regularly clipped lawn therefore returns to the soil much of the nitrogen taken up by the grass. The layer of grass also adds a small amount of mulching material, thus aiding in the conservation of moisture. And so the fruit tree in a lawn fares much the same as the tree in cultivation. Whether or not the orchard sod should be mowed every Saturday is a debatable question. The cost would probably exceed the returns.

Future of the Sucker Filled Baldwin

A mass of suckers around the inside is a characteristic of the Baldwin tree recovering from frost bited of 1933-34. In many Baldwin orchards little, if any, of this new growth has been removed and this is in agreement with a no pruning policy recommended for such winter injured trees. Now the question arises - What of the future? Certainly we can't leave this crowded assortment of sprouts to remain indefinitely, and if we prune this year, what shall we remove? The writer suggests two fundamental ideas which should be kept in mind as we reshape the 'crippled tree. (1) Replacements should come from those parts of the tree now making good growth. Often a vigorous shoot or sucker is the logical successor for an older, weaker branch whose growth has slowed down. Wherever possible 'active growth should be salvaged in the rejuvenating process. (2) A general thinning of the entire tree is better than a skinning of the inside. An occasional shoot or sprout left here and there may, through its own leaf area, contribute to the winter hardiness of nearby tissues. We ought not to be in too much of a hurry to remove all inside secondary growth. Pruning an apple tree involves a gradual renewal of the fruiting wood, not through wholesale slashing, but through replacements all over the top. In the sucker filled Baldwin we have a good chance to trade poor branches for others of greater promise.

Another Reminder About Infested Drops

The season of maggot infested "drops" is here. A single worthless apple on the ground in August may be responsible for half a dozen maggot flies in the tree next July. Drop apples from the trees of summer and fall varieties are much more dangerous from the standpoint of breeding maggot flies than are the drops from winter varieties. Eighty per cent of the maggots in Wealthy drops may mature into flies, while only 10% of the maggots are likely to mature in Baldwins. Moral - Pick up and destroy promptly all those infested drops which soften up readily if you would simplify the task of controlling maggot in 1936.

Apple Inspection Service Again Available

If you happen along a country road this fall and find two or three men juggling the contents of a couple of apple boxes, at the same time making copious notes, you will know that the eighth season of apple inspection work in Massachusetts is under way. An announcement of this service with return card is being sent out about the middle of August. The inspection will cover preventable blemishes, grade distribution, and an analysis of the below grade portion of the sample. A prominent orchardist says that a crop of McIntosh should run at least 60% Fancy. Otherwise there is something radically wrong with the production practices.

MASSACHUSETTS STATE COLLEGE
UNITED STATES DEPARTMENT OF AGRICULTURE
AND COUNTY EXTENSION SERVICES IN AGRICULTURE AND
HOME ECONOMICS COOPERATING

FRUIT NOTES, MAY 1936

W. H. Thies
Extension Horticulturist

Back in the Trenches

Work has been resumed in the study of root distribution and its relation to tree behavior. This project was begun last fall in cooperation with the departments of Agronomy and Botany, when trenches were dug in 10 Massachusetts orchards, as follows: Middlesex County 5, Worcester County 4, Hampshire County 1. At least two trenches were dug in each of these orchards with the idea of studying subsoil conditions in relation to tree behavior. Some striking comparisons were thus obtained which throw considerable light on such things as small size and color of fruit, early drop, and leaf scorch. We are beginning to feel that the water relations in the orchard are tremendously important. Apple trees have been planted on all sorts of soil ranging from those underlain by porous gravel to others having a subsoil of extremely compact, fine sand. Waterholding capacity of the subsoil may vary from 15% to 50%. Roots in some cases penetrate to a depth of only two feet and in other cases, six feet.

Thus far this spring a careful study has been made of soil conditions in four orchards, in each of which illustrations have been made by Mr. Stephen Hamilton showing the details of root distribution and of soil type including depth and color of the various layers. Work will be resumed this week in Essex and Bristol Counties. The orchards thus far studied this spring were located in Stow, Sherborn and Amherst. As the work progresses, we intend to include a study of orchards on all of the major soil types in Massachusetts. When this information is assembled, we shall then have a better understanding of the relation between soil type and tree behavior. With these facts in mind, we shall be better able to advise regarding the adaptability of soils to tree fruits and at the same time we shall be able to diagnose more accurately water deficiencies which now exist in so many orchards in the state. The cooperation of Massachusetts growers thus far has been very encouraging.

Limitations of Soil Analyses

There are still some people who like to believe that the soil chemist can take a handful of soil and with a few simple analyses tell just what that soil needs for any kind of crop. In reality, what he can actually tell is of little value in the absence of such information as soil drainage, slope, type of subsoil, and the water relations which determine the ability of the plant to get water throughout the season. We would not for a moment underestimate the value of such things as the measurement of soil acidity. In our opinion such measurements are very important. But when it comes to a measure of the amount of potash in orchard soils, there seems to be little relation between the actual potash content in a soil sample and the behavior of a tree growing on that soil. Some surprisingly good orchards seem to be

located on soils of relatively low potash content. Perhaps this is due to the fact that a tree sends its roots far and wide and to a considerable depth. But unless the tree is able to obtain what water it needs throughout the season, minerals in the soil will not necessarily be the important limiting factor. A fluctuating water supply is probably the cause of more failures in tree behavior than are actual deficiencies of potash and phosphorus. There must be an adequate water supply if the tree is to take full advantage of the various mineral elements.

Does it pay to mulch?

We think of New England as a good hay growing section. Soil and rainfall are generally favorable for a growth of grass. And if grass is beneficial in the orchard, it ought to be possible in many cases to provide a liberal mulch at moderate expense. In a recent bulletin by Shaw and Southwick of Mass. State College (Bul. #328) we find some light on this interesting problem. Mulching is found most advisable under these conditions:

(1) where there is a convenient and cheap source of material, (2) on comparatively steep slopes, (3) on rough stony land, (4) on loose, gravelly soils likely to suffer from lack of water in dry periods, (5) on varieties apt to drop heavily near harvest time, and (6) where root injury from cold is severe. The possible objections to heavy mulching are cost, danger of fire, and danger of injury from mice. According to this bulletin a layer of hay or other vegetation over the soil keeps the soil a little cooler in hot weather and warmer in cold weather, conserves soil moisture in dry periods, and after the first two years furnishes soil nitrates. It also prevents soil erosion and favors absorption of rainfall.

Submerged and Yet Thirsty

In an experiment performed not long ago in New York State, some young apple trees growing in large containers were kept for some time with roots submerged in water. Under these conditions one would naturally think that the tree would obtain all the water it wanted, but in reality, the tops actually showed symptoms of drought. Excess water and a consequent lack of air seemed to interfere with root activity to such an extent that little water was taken in. This experiment illustrates how difficult it is to interpret plant behavior. We are so likely to draw wrong conclusions. These results help to explain why trees growing on a wet soil sometimes show such drought symptoms as an early drop of fruit. Submergence of the roots during the dormant season is apparently not as harmful as when it occurs during the growing season.

Overpruned and Underfed

Not long ago the writer visited an orchard in Western Massachusetts and noted very wide differences in the behavior of the trees in two of the blocks. The poorest block on the farm showed a constantly decreasing rate of growth, very serious injury from borers, and a decidedly unhealthy condition of the trees. Incidentally, these trees had been very drastically pruned and the hay had been cut and removed for a number of years. An adjoining block had been allowed to grow up to brush and had been almost completely neglected. Strangely enough, this latter block looked much more promising

than the block which had received so much attention. The orchard manager, in his efforts to improve the trees had actually done more harm than good. The ^{neglected} trees looked quite promising. Without underestimating the value of good pruning, it is safe to say that many apple trees, particularly in the smaller orchards, would be better off today if the owner had never owned a pruning shears or a saw. One of the most common tendencies among growers is to under prune the older, taller trees and to over prune younger trees which can be reached from the ground.

The Fruit Tree as a Unit

The fruit tree, and particularly the apple tree, behaves as though it were a number of individual plants on the same root system. This fact was brought very strikingly to our attention a few days ago while trees were in full bloom. A tree in Amherst which happened to be in the off season was entirely devoid of blossoms except for one small grafted limb of a different variety. This limb was full of blossoms even though the surrounding limbs had no blossoms at all. In our treatment of a tree we fertilize, prune and spray as though it were a unit, and yet the individual branches are more or less independent of each other. A particular root tends to support a particular branch. If a tree is fertilized on one side, it tends to make better growth on that side. Another example is found where one side of the tree is seriously injured by mice or by a canker. The limb above that point may be seriously affected. At the same time, water taken in on one side of the tree is easily transferred around to the other side of the tree, and it has been found that the fruit growing on a particular limb is able to draw from the leaves at a considerable distance, even as far away as ten feet. It is well to remember, however, that the individual spurs on a tree are competing with each other for water, mineral elements, and sunlight. Pruning, thinning, etc., should therefore be done with these individual parts of the tree in mind. In a sense the tree is a unit made up of many more or less independent parts.

The Long Look Ahead

What are the prospects for the fruit grower in Massachusetts? This question is asked very often and it deserves a fair answer. Our answer is this. We live within trucking distance of many millions of consumers. If these consumers continue to eat fruit, and there is no reason to believe that the coming generation will not differ greatly from the present in that respect, the demand for fruit of one kind or another seems assured. And if fruit is to be grown it seems only reasonable that it should be grown where yield and quality are high. No one can hope to succeed in strawberry growing if his yield is only half that of his neighbor, and particularly if his cost of production is 9¢ per quart while the price is 10¢. Neither can a grower succeed in apple growing if his McIntosh drops prematurely every year, or if his blossoms are uninjured by frost only in those years when every one else has a crop of apples. Briefly, then, we would say that the fruit planting in a poor location stands very little chance of success. At the same time, we have in Massachusetts some of the best fruit soils to be found anywhere in the United States and even though our yields are not as high as those in the Northwest, our lower cost of transportation should help to make the well located enterprise a profitable one over a period of years.

The Chestnut Attempts a Comeback

A fruit grower in eastern Massachusetts told us a few days ago that the chestnut timber on a particular piece of land now planted to orchard, sold in 1850 for \$1,000. The land was then allowed to grow up to chestnut timber again and in 1880 there was once more a sufficient timber crop to sell for \$1,000. Those were the good old days in so far as the chestnut tree was concerned. It is doubtful if forests of chestnuts will ever again cover the hillsides of Massachusetts although the fruit of the chestnut tree, an Asiatic chestnut this time, may again be enjoyed by New Englanders. About 20 lots of chestnut trees of promising varieties, comprising 25 trees each, have been distributed this spring by Dr. O. C. Boyd, plant pathologist at the State College. These trees were furnished by the U.S.D.A. at Washington for test purposes in Massachusetts. They will be given ordinary orchard care in the hope that here and there a start may again be made in the growing of this interesting tree, for fruit at least, if not for timber.

Fruit Insect Parasites

The use of nicotine sulfate in certain spray applications has become so common that fruit growers use it as a matter of habit. But nicotine is expensive, and everyone is looking for either a substitute or a disappearance of the various sucking insects. For several years the work of parasites, particularly of aphids, has been watched with much interest. This season there seems to be a larger than usual number of these parasites at work. In some trees the parasite population is so large that aphids are literally as scarce as hen's teeth. The more important parasites are ladybird beetles, syrphus flies and lacewings. A few days ago we watched a syrphus fly larva as it mowed its way through a colony of aphids on an apple leaf. Without the advantage of eyes, it located its prey as it swung its head from side to side. In about five minutes, it had completely dispatched five grain aphids and was still looking for more.

Apple Trees for Looks or for Fruit

In a recent issue in the Rural New Yorker there appears an interesting article by F. A. Waugh which stresses the beauty of the apple tree. He points out the desirability of the apple tree for the home grounds. We think of the apple tree, of course, as being most beautiful during the blooming season and yet it excels as a shade tree as well. Even during the dormant season it is a thing of beauty. The article is well worth reading. And then, whether intentional or not, the editor inserted just below this story a question by one of the readers on the prevention of wormy apples. This discordant note did not in any sense of the word detract from the interesting story above, but it did call to our attention the kind of apples which grow on unsprayed trees. Maggots, curculio, codling moth, and what have you, will take their toll unless we do something about it and that is not always so easy where apple trees are in close proximity to buildings. Of course, if we are content to enjoy only the beauty of the tree we can forget the fruit and buy our apples from someone who makes a business of growing them.

Will Poison Bait Control Mice?

In a recent questionnaire sent out by E. M. Mills in charge of Rodent Control work in the Northeast, data has been assembled showing the amount of

mouse injury in apple orchards during the past winter. In years past, an extremely small number of trees have been injured where the bait was used. This year there has been a slightly larger percentage of injured trees and in a few cases the owner has seriously questioned the effectiveness of poison bait in the control of mice. In no sense of the word has the bait appeared to be a failure and yet a few growers who thought they had used the material as recommended still had a considerable amount of injury. This brings up the question as to the proper method of preventing mouse injury in apple orchards. A study of the replies of various growers leads one to believe that the owner himself has a real responsibility in the matter and that most of the cases of failure were due either to a heavier than usual infestation of mice or to a slip of some kind in the use of the bait. Mouse injury began fairly early last fall. This meant a need for an early distribution of the material and the use of suitable containers. Where many mice were present it was necessary of course to replenish the supply of bait. Some growers try to economize by the use of envelopes, which in seasons of a light infestation have proven quite successful. Perhaps last season was not the season to economize in the matter of mouse insurance. Glass bottles or jars, tin cans, wooden stations, etc., seem to be quite satisfactory. We have a number of growers who used the poison bait very extensively and in most cases the results are still highly satisfactory. Until further evidence is presented, we shall maintain that mice can be controlled by the use of poison bait, provided full precautions are taken. Incidentally, the removal of sod around the trunk of the tree and its replacement with gravel or cinders is an excellent supplement to the use of poison bait.

Plant Physiologists Meet in Storrs, Conn.

On May 8 and 9, it was our privilege to attend the spring meeting of the plant physiologists of New England. Most of the papers were highly technical and of interest mainly to the research worker in that particular field. The average grower would find little interest in a paper on the organic acids of rhubarb leaf tissue, or on the nutrition of seedlings in sand cultures. He would, of course, listen attentively to a talk on the nutritive value of blueberries. The major portion of one day was devoted to a symposium on the subject of light, with particular emphasis on the measurement of light. The importance of light in the growing and fruiting of plants is emphasized by the fact that these research workers devoted so much time to the discussion of the problem. Even the casual observer can readily detect differences in the behavior of different parts of the plant as a result of differences in light exposure. The little green apples on the inside of a tree are in that condition not alone because of the lack of exposure of the fruit itself but because the leaves in the vicinity of those apples are also under a handicap.

Curculio Appears on Time

In the spring of 1935 W. D. Whitcomb of the Waltham Field Station reported a much larger than usual percentage of the curculio beetles in the trees at blossoming time. Something like 30% of the total beetle population was at that time subject to control by the Calyx Spray. This season the number of beetles emerging at blossoming time was still in excess of normal although not as great as in 1935. The Calyx Spray application was, however,

of importance in the control of curculio this year. At a meeting in Colrain on May 18, several of the growers expressed an interest in curculio and one of them asked what the curculio beetle looked like. With some misgivings we borrowed a blanket and attempted to jar one of the early emerging beetles from a nearby plum tree. As luck would have it, a beetle was obtained with very little effort and introduced to some of the assembled fruit growers for the first time. In fighting this troublesome pest, it is well to remember that many of the beetles spend the winter in brush land, stone walls, etc., adjacent to the orchard. When they emerge in spring they naturally go to the nearest tree. For this reason, it is highly important, particularly in a large orchard, that we spray the outside trees first in order to kill the beetles before they migrate to other trees and cause damage.

"I Just Followed the Spray Schedule"

Not long ago the writer visited an orchard in the town of Granville. While looking over the trees with the owner the question of growing plums was discussed. The grower remarked he had been getting very good crops of plums and that they had sold fairly well. We asked him if he had had any trouble with brown rot and if so what he had done about it. His answer was, "I follow the spray schedule." Next, we walked into a pear orchard and noted at once how healthy the trees appeared and how free from any evidence of pear psylla. So we asked him what he was doing to control pear psylla. His answer was the same as before, "I follow the spray schedule." Without asking what he was doing about pests in his apple orchard we knew from past experience that his fruit was unusually clean and that here, too, he must have "followed the spray schedule." And so at last we had found a modest man, who was claiming little or no credit to himself but was merely following directions. The facts in the case are that this man has a spray schedule and uses it, but at the same time he also has an efficient sprayer which he uses with equal effectiveness. When he sprays a tree he does a thorough job. He is continually crowding his work instead of letting the work crowd him.

MASSACHUSETTS STATE COLLEGE
UNITED STATES DEPARTMENT OF AGRICULTURE
AND COUNTY EXTENSION SERVICES IN AGRICULTURE AND
HOME ECONOMICS COOPERATING

FRUIT NOTES, JUNE 1936

W. H. Thies
Extension Horticulturist

Where Can I Buy it?

Very frequently the fruit grower asks, "Where can I buy this or that piece of equipment?" The answer is easy. Consult the Buyers' Guide in the June issue of American Fruit Grower. Here will be found a very complete list of dealers in everything needed for the fruit farm. The classified index lists everything from apple corers to stump pullers. Here are the general index headings: Canning, preserving, and juice extracting, commission merchants and marketing agencies, fencing and trellises, fertilizer, fruit farm home, insect and disease control, irrigation and drainage, nursery stock, orchard instruments, packages and packaging, packing house equipment, picking, pollination, pruning and grafting, storages, and tillage equipment. An idea of the completeness of this list is indicated by a listing of 10 concerns dealing in fruit presses, 17 in spray nozzles, 17 in wettable sulfurs, 10 concerns dealing in grafting wax, and 24 in bees and bee supplies. The publishers have gone so far as to list dealers in thermometers, soil testing outfits, and dynamite. This Buyers' Guide of the American Fruit Grower fills a long felt need. Every fruit grower should have a copy for reference.

The National Apple Crop

On June 1 it was estimated that the 1936 apple crop in the United States would be 46.7 percent of normal as compared with 71.3 percent last year and 67.8 percent for the 10 year average prior to 1932. This is the lowest June 1 estimate of apples since 1921. Present indications point to one of the smallest crops in recent years. In the Pacific Northwest the set of fruit is only fair, due to the severe freezes of last fall and winter and unfavorable rainy weather during the blossoming period. New England as a whole has an estimated crop of 57.7 percent of normal as compared to 76.3 percent last year. The estimate for Mass. is 62% compared with 81% last year. And so it appears that the national apple crop will be relatively small and that we in New England are not as bad off as we might be. All things considered, this may be the year to take better care of our apple crop. Thinning should be a profitable practice on Wealthy, Delicious, and in some cases on Baldwins. McIntosh appears to have set lighter than most other varieties. It costs about so much to harvest and pack apples regardless of size or condition. It is good business judgment to eliminate the unfit apples of the tree before harvesting time. Thinning and a good spray program contribute to that end.

Treating Tree Wounds

Tree surgery is generally of little interest to the commercial fruit grower, and rightly so. If a fruit tree is properly developed from the start, by encouraging rapid growth and by maintaining a leader, there should be little if any breakage of limbs and consequently little need for repair work up to 30 or 40 years of age at least. Prevention is certainly better than cure in the matter of decay in the apple tree. Only occasionally do we find an apple tree which justifies anything in the way of tree surgery. The exception is found in the small planting, particularly where apple trees are used as ornamentals in the home grounds. Anyone interested in the treatment and care of tree wounds will find in U. S. D. A. Farmers' Bulletin 1726 (published in 1934) an interesting and practical discussion of this whole matter. The discussion covers structure and life processes of trees, causes of injury, and the details of treatment. The field of tree surgery is discussed in an interesting and understandable way.

When a Limb "Goes Bad"

How commonly we find a weak, sickly looking limb on an otherwise vigorous tree. Only recently a number of trees of this type were observed in a Hampden County orchard where one side of the tree showed exceptionally good vigor while the other appeared to be dying gradually. A little investigation of the bark of the trunk near the ground level often reveals the reason for differences of this kind. Much of this injury dates back to the cold winter of 1933-34. Just why one side of the tree suffered more than another may in some cases be explained this way. In many of our orchards on sloping ground erosion and cultivation in years past have exposed a portion of the lower part of the trunk and of the main roots which are normally protected by a layer of soil. Exposure at this point is sometimes due to a deliberate removal of sod and soil around the base of the trunk for mouse protection. Whatever the cause of exposure in the first place, low temperatures have raised havoc with a very tender part of the tree. The condition of the top today is often a direct indicator of the extent of injury around the trunk. Where the injury almost completely encircles the trunk, the tree is in a bad way. Where it affects only a third or less of the circumference, only a limb or two may be affected. To diagnose this kind of injury we suggest scraping away the soil with a hoe and examining the bark near the ground level. If no injury is apparent at that point, it may be well to look deeper for possible injury from pine mice, or higher up on the trunk, for evidence of cankers or other destructive agencies.

Cooperating With the Tree

When we consider just how fruit is produced on a tree, it appears that the fruit grower is in reality a grower of leaves and not a grower of fruit. Without leaves there can be no fruit so we set about to encourage the tree or other fruit plant in the growth of an efficient set of leaves. We fertilize, we prune, and we spray primarily to bring about good leaves. True, part of our spraying is done to protect the fruit, but first of all we

are concerned with the development and maintenance of the right kind of leaves. Even in thinning, we are merely assigning a proper quota of leaves for the remaining fruit. And so in answer to the question, "Am I a fruit grower", the writer answers "No, I merely cooperate with the tree in the growth of good leaves, and incidentally, the tree somehow grows a crop of fruit."

Results of Setting Immature Fruit Trees

Two U. S. D. A. investigators, Gardner and Yerkes, report the following observations at Arlington Experiment Farm, Virginia. Mazzard seedling cherry trees were dug at weekly intervals from Sept. 22 to Nov. 24. The results show that digging before a certain degree of maturity is reached is decidedly harmful. In the Sept. 22 lot, only 10.5 percent survived as compared with 99 percent for the stock dug Nov. 3. This bears out the experience of others who have attempted to transplant trees before they were fully mature in the fall. It appears that unless the tree has had time to store up a good supply of carbohydrates in the fall, its chances of survival are none too good. A few days ago we heard of a prospective orchardist who is planning to set several thousand trees next Sept. Our advice is summed up in one word "don't".

A Young Tree in an Old Orchard

It is a matter of common observation that a young tree planted where an old one was removed, fails to make satisfactory growth. The reason is not always apparent. In years past it was believed that the soil which previously supported the tree may contain a toxic material which retards the growth of the new tree. If the young tree is surrounded by older trees, poor growth can be explained on the basis of root competition and shading. Since the roots of a tree extend outward much farther than the branches, the young tree encounters serious competition, since the soil to which it is entitled is already being occupied and exploited by neighboring trees. Lighting conditions may also be unsatisfactory if the older trees are less than 40 or 50 feet away.

An interesting experiment was recently reported by two workers at the Ontario Horticultural Experiment Station, Vineland, Ontario. Nursery stock was planted on an area from which a peach orchard had been removed. Measurements of the young trees showed that the areas of weak growth coincided almost exactly with the former location of the peach trees. Six years after the removal of the peaches and when almost all old roots of the peaches were completely disintegrated, it was still possible to detect the location of peach trees by the inferior growth of the young nursery stock. Chemical studies of soil samples showed a clearly defined difference in soluble phosphorus and potassium in favor of the spaces not previously occupied. Also, corresponding differences in nitrogen were noted as might be expected, while the old roots were decaying. And thus it appears that the soil in this nursery had been partially depleted of available plant food by the previous trees. All of these things seem to point to the need for giving the young tree especial attention if we expect it to grow.

What is a Weed?

A. J. Peters of the U. S. D. A. defines a weed as "a plant that does more harm than good, and that has the habit of intruding when not wanted". A recent bulletin from Cornell University, (bulletin No. 635) lists more than 400 so-called weeds commonly found in New York State. But folks are inclined to disagree except for a few pestiferous plants, as to the exact meaning of the term weed. A plant growing in one place where it competes seriously with a garden or field crop is certainly a weed. That same plant growing in the orchard may easily do more good than harm. From the standpoint of organic matter, any plant grown in the orchard during that part of the season when it is not competing directly with the tree for nitrogen, may be beneficial. Perhaps if we were to keep our eye on the weeds in the orchard and note the way they grow or do not grow, we would then be better able to feed the tree. For when and only when the soil is in such condition that it will support a good weed growth, is the tree likely to be a profitable one. Speaking of weeds, the filler tree is as much of a weed as the golden rod which grows beside it, whenever that filler tree is encroaching upon soil and sunlight to which the permanent tree is entitled. In the strawberry planting, surplus strawberry plants are often more troublesome from the weed standpoint than plants ordinarily classed as weeds.

When Do We Eat?

We are thinking not of animal nutrition but of feeding the orchard. Just when does an apple tree eat? Is it a daily or an hourly process, or can it like the camel fill up for a day or two ahead? In the case of water, the intake is a constant procedure. As water is lost through evaporation there must be an intake through the roots to replace the loss. In the case of nitrogen the tree can apparently store up a supply for weeks or months ahead. For example, if we feed a tree liberally with a readily available nitrogen in early spring, it will have enough on hand when it is urgently needed around blossoming time, and later applications will be unnecessary. There is apparently little need of a so-called "split application" of nitrogen. The one fact of importance in nitrogen fertilization is that the tree demands a liberal nitrogen supply in May and June and is then better off if the nitrogen supply is somewhat restricted. In other words, early nitrogen favors early leaf growth, and early leaf growth favors rapid maturity of the fruit and a set of fruit buds for next year. All signs therefore seem to point toward the importance of early leaves on the trees, particularly on the spurs.

Early Nitrogen Supply Important

"The greatest benefit to apple trees from nitrogen is at the time of full bloom and shortly thereafter. Fruit trees may be grown without the use of fertilizers but in the long run crops will not be satisfactory under such practices. The only exception to this rule is where the trees are young and vigorous and the soil is unusually fertile and deep. Such soils are not common in our fruit growing regions." These words are taken from

Bulletin 363, "Fertilizing Fruit Trees with Nitrogen", published by the University of Missouri, Agricultural Experiment Station, in April, 1936. The author, A. E. Murneek, says, "There is a prevailing opinion that the greatest need for nitrogen by fruit trees is at the time of flowering and leaf development. Hence the fertilizer should reach the roots and be absorbed early in the spring. Not only fruit setting is effected by nitrogen but also the shoot growth and development of leaves". This publication summarizes our present day knowledge of nitrogen needs in the orchard. Few principles in horticulture have been demonstrated more conclusively. We know now that the high producing tree must of necessity develop its leaves early in the spring, and this development requires plenty of nitrogen as well as carbohydrates stored the previous fall. The tree with a larger than normal leaf area at blossoming time has a decided advantage over a tree which is slow in developing its leaves in the spring. This fact emphasizes the need for storage of carbohydrates in the autumn and for an abundant supply of nitrogen in the tree at blossoming time.

Grow More Humus in the Orchard

Quoting from a recent issue of the Rural New Yorker, R. E. Stephenson in an article on orchard cultivation says, "In a certain orchard half the humus was burned out after 11 years of clean cultivation. These results are typical of what occurs when fertile soils are cultivated. The effect upon the tree is good at first. Large supplies of plant nutrients are released by tillage and tree growth is stimulated. In a few years the picture changes as the humus is reduced". We are beginning to appreciate the value of organic matter in the orchard. Recent dry seasons have brought many evidences of a fluctuating water supply. And unless the orchard soil is deep and of good water holding capacity, the supply of organic matter takes on much importance as a means of preventing surface run-off and of holding a little extra water for a time of need. The easiest way to reduce the amount of organic matter in the soil is to practice constant cultivation. This loss may be partially reduced by cultivating for a shorter period in spring and then making sure that a good cover crop is grown to replace the organic matter "burned out" through cultivation. While the trees are young and the ground not completely shaded, we ought to treat the soil between the trees in such way that it will make a maximum contribution to the future profitability of the orchard. It is difficult to grow a heavy cover crop after the branches begin to crowd.

A Note on Orchard Irrigation

In U. S. D. A. Technical Bulletin 491, Magness, Dogman, and Furr report the relation of soil moisture to tree response in irrigated and non-irrigated apple orchards in western Maryland. The report shows that at some time during each season (1930-33) there was a reduced fruit growth rate due to shortage of soil moisture in spite of the fact that in three of the years the rainfall from May 1 to October 31 was above normal. In most cases the growth rate of fruit of trees growing in silt loam or silt

clay soil was not measurably reduced until at least the driest part of the root zone approached the silting percentage. In the case of a moderate drought causing no serious loss of foliage, growth of fruit was resumed at an apparently normal rate when the moisture supply was restored, but the ultimate size of the apples was reduced in proportion to the length and duration of the drouth. Irrigation increased the yield of Rome Beauty trees more than 50% but was of little benefit in the case of Oldenburg, an early summer variety. With relation to color development, a shortage of soil moisture resulted in fruit of dull, lifeless appearance. Moderate moisture promoted maximum color, while an excess of moisture tended to reduce color. Fruit bud formation was apparently increased by early season shortage of moisture but after late July there was no apparent effect. The earlier closing of stomates forecast a moisture shortage prior to actual reduction in the growth rate of fruit.

Soil Temperature and Root Activity

In a recent bulletin by Collison of the N. Y. Agricultural Experiment Station (Tech. Bul. 237) may be found an observation about an interesting side of orchard behavior. He finds root elongation and therefore nutrient absorption may take place during periods when air temperatures were below zero. Soil temperatures, however, were not far from the freezing point. The insulating effect of the soil is shown by the following figures. The lowest soil temperature recorded was that in February, 1935, when the A horizon of the soil dropped to 25 degrees F., only 7° below freezing. During the summer the highest recorded soil temperature was 68° F. early in July. The author believes that some root activity goes on while the soil temperature is within 2 to 5° of the freezing point or even less. This being true, it is easy to understand how the tree can take up nitrogen during the dormant season, as well as moisture to replace that loss made by evaporation. Incidentally, the vegetative cover on the soil is an important factor in water penetration and movement. A humus filled soil may be expected to show less variation in moisture content and probably in soil temperature than a soil deficient in humus.

Organic Matter in the Soil. Why?

Because (1) it acts as a reservoir for plant food, liberating some nitrogen as it decays, (2) it acts as a sponge in holding soil moisture, (3) it maintains soil organisms which have a beneficial effect on the liberation of plant food, (4) it acts as a soil conditioner and tends to loosen heavy soils and bind light soils, (5) it tends to warm the soil by absorbing more of the heat of the sun. In short, it is responsible for one of the important differences between a real soil and a mere physical mixture of clay, sand and gravel. If organic matter is supplied by means of a mulch, we have such additional benefits as the holding of precipitation, thus preventing surface run-off, smothering of competing vegetation such as grass and weeds, prevention of evaporation from the soil, and as a padding for drop

apples at harvest time. We cannot afford to lose the opportunity to increase the organic matter in the orchard. Neither can we afford to cultivate in a way that will burn out the organic matter now present. Our orchard practice must be of a kind that maintains, and if possible, increases the organic matter content of the soil.

Erosion Losses in New England

Many farmers are tilling what was originally a subsoil without knowing it. Hilltops and hillsides subject to surface run-off have in many cases lost from 6 inches to several feet of the surface layer which is now spread over the valleys below. This fact is strikingly illustrated when we dig a hole or trench at the two levels. On the hilltop we find a very shallow layer of so called top soil, while at the foot of the hill the layer will be many times as thick.

Some recent work in New York State throws further light on this question. Land that slopes about 10 feet for each 100 feet, a relatively gentle slope for that area, was cropped to potatoes and cultivated up and down the slope. There was a loss of 14% of the rain water in run-off, and 28,000 pounds of fine top soil to the acre in a single year. Idle land grown up to weeds lost almost as much rain water as the potato field. Fields on the same soil and slope as the potatoes cropped in alternating strips crosswise, lost only 1% of the rain water in surface run-off, and 43 pounds of soil to the acre. Thus the water loss was reduced 14 times and the soil loss 650 times. Land in a good stand of grass and clover lost very little water and soil. Many of our New England orchardists need this lesson brought home to them since it has a definite relation to soil conservation, particularly as regards mulching, seeding down, etc. It is claimed that 3/4 of the land in the United States is sloping. New England seems to have its full share.

Soil Factors Effecting Orchardling

In a recent issue of the Rural New Yorker there appears an article by F. C. Hollis. He says, "Extensive studies carried on in many apple orchards have shown that there is such a definite relationship between the yield of fruit and the soil that one can predict the chance of profitable operations if soil characteristics are known. By selecting a proper soil, much of the gamble can be removed in the management of the orchard. No fertilizer treatment can completely overcome a naturally unadapted soil. There is no use to prolong the life of an orchard which should never have been planted. The same land may be well adapted to some other crop." Mr. Hollis goes on to say that a survey of New York State showed that over 40% of the orchards in one of the fruit sections were on marginal or utterly unfit land. Apples require deep rooting in order to supply water and nutrients at all times. Roots need oxygen which is excluded by water. The roots naturally grow vigorously for a period of a month or six weeks before the buds break in the spring and again in the fall when leaf growth has stopped. A high water table at these times is

very undesirable. Soils in which the subsoil is near the surface are usually poorly drained. The gray layer of soil allows water to pass through very slowly and sometimes not at all. Later when the water does recede and a drouth comes, the trees have a weakened root system and are unable to absorb the water necessary for fruit development. Our orchard trenching operations in Massachusetts tend to support the above statement.

Orchard Sanitation in Illinois

A timely publication from Illinois (Circular 443) discusses the practice of sanitation for apple orchards. Since codling moth is so serious in that section, the authors of this publication have stressed a large number of supplementary factors as a means of controlling this pest. Here are a few of these practices: (1) Scrape trees to destroy hibernating places, (2) destroy wormy fruit, (3) encourage birds, (4) clean up orchard debris by pruning thoroughly and burning the prunings, (5) use chemically treated bands, (6) Guard against packing shed infestation, (7) dip orchard crates before moths emerge, (8) dispose of low grade fruit promptly. In New England it has not been necessary to do all of these things in codling moth control. But we have other pests equally troublesome. Curculio and maggot would be less of a problem if our growers were to follow the Illinois example in doing such things as these: get rid of breeding places in and around the orchard, eliminate favorable hiding places for curculio in brush and stone walls, and in the case of maggot spray all trees in the orchard whether bearing or not including those within infesting distance, and destroy all infested fruit promptly. We place a tremendous responsibility on the spray program, if we attempt to control pests by spraying alone. A thorough clean-up of the orchard and vicinity makes spraying easier and more effective.

Timely Hints for Vermont

M. B. Cummings of the University of Vermont offers about 12 bits of advice if we would "strike 12 in spraying". Here are his more important suggestions: (1) Use standard spray products, (2) avoid spray burn, (3) rinse the tank with fresh water every day, (4) watch the weather, (5) use plenty of spray, (6) improve the water supply in order to fill the spray tank quickly, (7) keep the sprayer in first class working order, (8) spray top and center thoroughly, etc. He also says "Do not spray on hot, muggy days. Spray in the cool part of the day, or at night. Do not use lime that is a year old since it deteriorates with age. Use chemical hydrated lime. Avoid sludge which may form in half an hour unless the agitator is working". Professor Cummings' suggestions are equally important in Massachusetts.

A Few Facts About Spray Residues

With the harvest season only a few weeks away, a word about spray residues is in order. The federal tolerance established by the Food and Drug Administration is the same as for 1935. The figure .018 grains per pound, however, means little

or nothing to the average grower. He has no way of knowing the amount of residue on his fruit without submitting a sample for analysis. This season, for the first time, the Experiment Station at the State College in Amherst, will be equipped to make analyses of lead and of arsenate for individual growers at cost. Any grower desiring to know definitely the condition of his fruit as regards the federal tolerance may avail himself of this new service. The method of taking the sample is, of course, important. Details regarding the amount of fruit required and method of sampling will be announced later. In connection with spray residue, this one fact must be kept in mind. There is a definite relation between the amount of residue at harvest time and the date of the last spray. The time of harvest must be considered as we spray for late season pests. If heavy rainfall was certain to occur this item would be less important, but having no control of the weather, the grower must rely upon proper timing of his sprays and upon the use of recommended materials.

Apple Midge at Work in Essex County

In the annual report of the Mass. State College Experiment Station, W. D. Whitcomb reports on the apple leaf curling midge as follows: This pest was normally abundant in 1935 in the infested area (Essex County and a few miles eastward). No definite increase in the known infested area was discovered. In the orchard, flies of the over-wintering generation were abundant from blossoming time until June 4. Mature maggots began to leave the curled leaves by June 18 and flies of the first generation were abundant during the latter part of July. Evidence was secured that migration of mature maggots depends upon moisture. He suggests the following schedule of treatment which should greatly reduce the abundance of midge and prevent its development into a serious pest: Cultivation under trees before blossom period. Application of one pound of calcium cyanide or two pounds of naphthalene flakes per tree just before the blossoming period. Addition of nicotine to Calyx and first apple maggot sprays. Application of betanaphthol treated corrugated paper bands to trunks of infested trees about June 15. It should be explained that the apple midge results in a very tight curling of the young leaves on apple shoots. Thus far its damage has not seriously interfered with the apple crop and it is to be hoped that its migration may be checked and that the application of the above schedule may not become necessary in Massachusetts orchards.

Observations of This and That

In our attempt to control scab in Mass. orchards this spring, there seems to be more than the usual amount of lime sulfur injury to leaves. Scab control seems to be a compromise between the highest possible protection against scab and the least possible amount of injury to leaves. The young chestnut trees planted by Thomas Haley in Orange this spring are making excellent growth. Incidentally, frost rings are in evidence on some of the Wealthies and Oldenburg apples in this orchard. Aphids appear to

be almost completely cleaned up by parasites. In the orchard of Edward Jensen in Granville it was necessary to jar several trees before a single curculio beetle could be found, and then one was finally located on a tree next to the woods. Rosy aphid is fairly abundant on certain trees in this orchard. In spite of the extremely cold weather when strawberries were coming into bloom, the crop **is** surprisingly good. Evidently only a small proportion of the blossoms and buds were killed. The strawberry crop in southeastern Mass. was none too good, due to a combination of frost, drought and weevil. Conservation of moisture now in the soil is imperative in certain orchards on droughty soil, in case we have anything like the drouth of 1935. Mulching is probably as effective as any practice in the conservation of water. It appears that two grape pests have been more common than usual this spring, the plume moth and the grape cane gall maker. The first apple maggot flies of the season may be expected within the next week or ten days.

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FRUIT NOTES - September, 1936

W. H. Thies
Extension Horticulturist

The "Drought Spot" Situation

In 1929 a number of cases of internal browning of Cortland and McIntosh were reported by Professor Latimer in New Hampshire. Other cases have since been reported from the Champlain Valley of New York, from Vermont and now from several orchards in Massachusetts. At least eight such cases have come to the writer's attention this fall. The term "drought spot" is used to describe a brownish condition of the flesh around the core, sometimes extending out to the skin. In severe cases the apple has a rough, warty appearance. Drought spot seems to be related to a water shortage in the apple at a critical time. There is some evidence to show that a drought when the apples are from one to one and a half inches in diameter may cause more injury than a shortage later in the season.

In the orchards observed thus far, we have noticed a number of things which point to a water shortage during the past summer. In one orchard, the trees are underlain by a ledge with little or no opportunity of seepage from a higher level. Drought spot seems to be most severe where the ledge is nearest the surface. In another orchard, where drought spot was very noticeable, the root system is shallow owing to an unfavorable hardpan at $1\frac{1}{2}$ to 2 feet. Incidentally, this orchard is so wet in early spring as to interfere with spraying. In a third orchard, trees which have been heavily mulched showed decidedly less drought spot than nearby trees without a mulch. In another case, young McIntosh trees are interplanted in an old Baldwin orchard just coming into bearing. Here, the water shortage may be due to root competition. There is considerable evidence to show that drought spot is more severe in Cortland than it is in McIntosh. Other observations point to the serious handicap of close planting on a droughty soil. A planting distance of 40 x 40 plus a liberal mulch, may be one way out of this difficulty in orchards already established. And in choosing a site for the new orchard, the need for a careful investigation of the subsoil cannot be too strongly emphasized.

The Curse of Close Planting

A few days ago we visited a 15-year-old McIntosh orchard in eastern Massachusetts which was planted 20 x 20 on a good soil. To say that the orchard now resembles a jungle, is putting it mildly. There was a heavy bloom last spring, and the owner went through the motions of spraying five or six times. But scab ran wild and what should have been a six bu. per tree crop of fancy fruit is very largely a crop of culls. More salable fruit could easily have been harvested from half the trees with much less ef-

fort. It takes courage to cut out mature trees as soon as the branches begin to touch. It's easier to wait for "one more crop", forgetting that the roots are crowding seriously and that the lower half of the tree is becoming less efficient long before there is serious crowding of branches. 27 vigorous trees to the acre with good exposure to light are almost certain to be more profitable than double that number of crowded trees. One Worcester County grower who is thoroughly sold on the idea of removing fillers promptly, reports the following: One McIntosh tree with plenty of space on all sides had a crop of $12\frac{1}{2}$ bu. $6\frac{1}{2}$ bu. were picked from the ground and the remaining 6 bu. from a short ladder. The average color was excellent. Ease of harvesting as well as spraying and thinning are real advantages of the well spaced orchard.

In a certain Plymouth County orchard the trees were originally planted 20 x 20. Half of them have been removed, leaving the remainder 27 feet apart, or 54 trees to the acre. The orchard is on a droughty soil and no mulch has been used. This year the crop averaged 8 bu. per tree but the size of the fruit was disappointing. Evidently there wasn't enough water in the soil to support a 400 bu. per acre crop. With half the number of trees properly mulched the owner might have harvested 300 bu. of high quality fruit. In the course of a few-years he will save enough on spraying, pruning and harvesting to pay for many loads of mulch material. Too many trees per acre is one of the most pressing problems of our Massachusetts orchards.

A Tip on Soil Management

Writing on the subject of soil management in the September issue of American Fruit Grower, F. E. Bear makes this pointed statement, "An orchard soil to give best results, must be well drained; it must contain a liberal supply of organic matter; and it must produce good yields of sod or cover crops. On this point there is not likely to be any disagreement. But a large percentage of our orchard soils do not meet these specifications. Some are too wet. Others contain very little organic matter and are too dry. Others are so unproductive of cover crops that it is a waste of money to sow them until conditions for their growth are made more favorable."

If we look around us we can see plenty of orchards which illustrate the truth of this statement. Where ragweed makes a growth of only six or eight inches we may be dead sure that soil conditions are not favorable for apple production. Such orchards may bear a fair crop in a year "when everybody has apples." But the successful orchard bears a good crop every year, including the year when apples are scarce. The orchard cover crop is an excellent indicator of soil needs. If the soil will grow a rank growth of grass and weeds we needn't worry much about the tree itself. But if through long continued cultivation and a failure to maintain a good supply of organic matter we find the soil getting harder each year and the growth of weeds scantier, it is high time that we embark upon a program of soil improvement. Cashing in on the organic matter in the soil is like drawing money

from a bank account. Sooner or later the account is depleted. This condition has already been reached in some Massachusetts orchards.

Thinning Raspberry Canes

In pruning the raspberry planting it is just as important that we remove the weak canes as it is to remove the canes which have borne a crop. Removal of weak canes may be left until spring or they may be cut out when the old canes are removed in the fall. For red raspberries, the Michigan Agricultural Experiment Station suggests leaving 10 canes in each 4 feet of row. If grown in hills 3 x 7 feet it will require about eight canes per hill to equal the 10 canes in 4 feet of row. In the case of black or purple raspberries, 4 canes per plant have given satisfactory results. The Illinois Agricultural Experiment Station suggests leaving all canes over $\frac{1}{2}$ inch in diameter. If too many canes are left in a planting, the extra canes tend to encourage disease by interfering with the circulation of air. The extra canes also act as weeds and they make picking more difficult. There is much to be said in favor of wire supports for raspberry canes. In the absence of such supports, the canes should be cut back enough to make them stiff enough to support a crop. Cutting back about a third is usually sufficient.

"An Apple a Day"

Folks are still talking about the interesting address of Dr. Manville given at the convention of the International Apple Association in Boston last month. Dr. Manville presented some new and revolutionary ideas about the value of apples in the diet. He said, "People have long known the value of apples in the diet, but this knowledge was the outgrowth of experience and it has only been very recently that the laboratory has revealed the various elements which are packed inside the skin of this ancient fruit. The chief sources of pectin today are the peel of citrus fruits and apple pomace. In eating citrus fruits the peel is discarded and the juice contains very little of this ingredient. There is probably no fruit the edible portion of which exceeds the apple in its pectin content. That portion of the pectin which is digested gives rise to certain products which when absorbed and carried to the liver enable that organ to get rid of many poisons. I do not hesitate to say that for children living in large cities and those living in areas where it is common for the temperatures to reach high levels, the use of apples will prove to be one of the greatest blessings of recent times. Evidence is accumulating that adults suffering from such conditions as intestinal ulcers may be cured by the use of apple pomace or apple powder."

At a meeting of the National Apple Institute in Cincinnati in June, Dr. Kehoe of the University of Cincinnati, spoke on "Human Lead Absorption and Excretion in Relation to Human Food". Dr. Kehoe cited recent experiments to show that lead taken into the human body does not accumulate as has been so generally believed. It is a known fact that a certain amount of lead is taken into the body naturally in all foods. To test the theory that lead accumu-

lates, Dr. Kehoe experimented with a young medical student. He was tested over a 4 month period during which time he lived in the laboratory. Careful chemical analyses showed that the amount of lead given off was practically the same as that consumed. An interesting account of this experiment is found in the July issue of the American Fruit Grower.

Thirsty Orchards

The following quotation comes from the Clip Sheet of the U. S. D. A., released September 20. "If a mature orchard received its needed 4 in. of rainfall each month, it would be equivalent to 108,000 gals. of water to the acre monthly or 3600 gals. daily," says the Bureau of Plant Industry. On the basis of 35 trees per acre, each tree should have a little more than 100 gals. of water daily." In a non-irrigated section such as Massachusetts, there is reason to believe that many apple trees come a long way from receiving the amount of water indicated above. Another author, apparently a little more conservative, has estimated that a mature 30 year old apple tree requires about 4500 gals. of water during the season. Figured on the basis of a five month growing season, this amounts to about 30 gallons per day. And even that is a lot of water.

Giving Apples a Sun Bath

As we visit orchards at harvest time we are a little bit disturbed by the practice of so many growers who allow apples to stand in the orchard exposed to the sun for 2 or 3 days or more. That this treatment improves the color of the apples on the top of the box cannot be disputed. And if only drop apples intended for immediate consumption were treated that way, there might be little objection. But if the apples are to be stored for any length of time after they are removed from the orchard, the quicker they can be moved into storage, the better. A day of exposure to the warm September sun may easily affect the storage life of the apple by as much as two weeks. Furthermore, an apple exposed to the sun after picking takes on an abnormal appearance, or as someone has expressed it, "a half baked appearance" which any good judge of apples should detect at once. Cool, clear, sunny days in fall will work wonders in developing an attractive color in apples on the tree. Man's efforts to do the same thing after the apples are picked are generally less successful.

One or Two Sprays a Waste of Time

Many samples of maggot infested fruit have reached the State College this fall along with a question something like this, "Please tell me what is wrong with these apples. We had the trees sprayed, but most of the apples are like the sample." In a few cases we have asked the sender for further information about his spray program only to find that the fruit received one or two sprays, including a spray at the calyx period. In the good old days it is claimed that "perfect" fruit could be obtained by spraying once or twice, but times apparently have changed. Without attempting to explain why we have such a horde of ambitious pests during June and July, we submit this simple notion. It doesn't

do much good to control scab and other pests which work during the month of May if we are going to allow the fruit to be ruined anyway during the summer by curculio and apple maggot. In other words, a one or two spray program seems to be a waste of time and money. Unless we have the equipment and the persistence to apply at least four well timed sprays it is doubtful if the effort is worthy to be called a spray program. The regrettable thing as we see it, is that so many amateur fruit growers are inveigled into paying someone to go through the motions of applying a spray or two with so little chance of worthwhile results. The fellow who brings his sprayer around when he gets ready, squirts the tree with a little of this or that and kindles in the mind of the owner a hope that some of his fruit will be clean, ought to be made to eat the entire insect riddled crop.

Stray Thoughts

Recent experiments show that leaf activity after harvest time is of vital importance in the next year's crop. Trees which lose their leaves early, or trees whose leaves are badly injured by leaf hopper or red mite are under a distinct handicap.

It is a safe guess that the apple tree bearing a large crop of large sized apples this season did not suffer seriously from lack of water. Small size of fruit, browning of leaves, and in the case of Baldwins, either a heavy early drop or considerable bitter pit, are almost unmistakable signs of a drought at a critical season.

Several growers have expressed the view that a reduced cost of harvesting and grading is one of the biggest compensations from growing a clean crop. It is a simple matter to grade and pack a crop which runs 90 or 95% free from preventable blemishes.

Far sighted growers are on the lookout for mulching material wherever it may be found. Hay continues to be the most popular material although straw is often used to advantage and one grower is even using cranberry vines.

With literally hundred of apple growers in Massachusetts trying out promising new apple varieties, a plate exhibit of Kendall, Macoun and other newcomers from around the state may well be planned for the annual meeting of fruit growers in Worcester.

Imagine picking 276 bushels of apples in a day! That is the record of a young man in Maryland. He explains his feat by saying that he "made every move count."

In certain competing sections, growers irrigate and fight frost every year. This, of course, adds to the cost of production but it also insures a larger crop. In handicapped locations, New England growers are beginning to consider both of these operations in an attempt to insure large annual yields.

MASSACHUSETTS STATE COLLEGE
UNITED STATES DEPARTMENT OF AGRICULTURE
AND COUNTY EXTENSION SERVICES IN AGRICULTURE
AND HOME ECONOMICS COOPERATING

FRUIT NOTES - October, 1936

W. H. Thies
Extension Horticulturist

An Objective in Pruning

The writer is convinced that one's viewpoint in pruning a fruit tree is mighty important. What we accomplish seems to depend very largely upon the ideal we have in mind. Without a clear objective, we may find ourselves like the football player who ran the wrong way and made a touchdown for the opposing team. We, too, may lose our sense of direction and carry the tree the wrong way.

Almost every day the writer passes an orchard which illustrates the truth of this statement. The workman, in pruning these trees, apparently considered every upright growing limb as a menace, and therefore something to be removed. And so he consistently cut out the young, vigorous limbs which grew upward throughout the tree. The "finished product" was a drooping affair composed very largely of older, downward growing branches which had partially outlived its usefulness. The removal of these latter branches instead of the ones which were removed, would have provided a gradual renewal of the fruiting wood, so essential as the tree grows older. Yes, pruning is a worthwhile operation if we leave the tree better than we find it. Otherwise, what's the use?

Is Fall Pruning Safe?

It was not until the severe winter of three years ago that our attention was directed toward the relative merits of fall vs. spring pruning of apple trees. Then it became quite apparent that the removal of large limbs in the fall left the tree in a weakened condition and the fall pruning wounds failed to heal. This may result from the loss of certain food materials in the branches, which if given time to move downward to places of storage in the trunk, would tend to encourage maturity and therefore winter hardiness. It took a lot of evidence to convince some of us in the spring of 1934 that there was any difference between fall and spring pruned trees. But the evidence accumulated as one orchard after another told its story. There was a real difference, and the difference was greater where trees were most heavily pruned in the fall. Among the trees most injured by the cold winter were certain top grafted trees whose tops were most drastically reduced before the cold weather set in. The moral is plain. Avoid heavy fall pruning. If you have trees which are to be made over, postpone the operation until late winter or early spring.

But what about the orchard where thousands of trees need pruning, and the hired help must be kept busy? Shall we take a chance and get as much as possible of the pruning done this fall? Well, that's up to you. If the winter is mild, it will probably

make little difference. Not knowing what the winter will be like, we might compromise by doing the necessary work on the younger, more vigorous trees, particularly McIntosh. In many orchards the pruning most urgently needed is that of removing weak, shaded, downward growing branches, most of which are less than an inch in diameter. Pruning of this kind will not tend to weaken the tree materially. But if there is need for removing many large limbs, it seems advisable to delay that part of the job until zero temperatures are past.

Mrs. Mouse Moves In

Among the 60 or more replies to a questionnaire on mouse injury recently conducted by E. M. Mills, we find this striking statement from John Hall, a fruitgrower in Lockport, N. Y. "7000 trees. Orchard in clean cultivation with straw mulch. Bait put under straw in tin cans. Refilled 7 times. Found 7 dead mice under one tree. Mice moved in from adjoining fields. Police dog got 54 mice in one day, 56 the next. Had 6 trees completely girdled, 15 partly."

Another interesting reply comes from John Keller, New Paltz, N. Y. "26,000 trees. Used home mixed bait before prepared bait came out. No injury for 12 years. Trees dug around for 3 feet. Plain board (12x18) placed on ground for two weeks to draw mice. Bait then put under and filled again in two weeks. This is done during summer and again in fall. Find many dead mice."

A study of Mr. Mills' summary reveals these facts. The degree of mouse control seems to depend on the mouse population in the orchard and on the grower's persistence in carrying out a control program. Mounding of trees or the replacement of sod with cinders or gravel is a worthwhile supplementary practice. More mouse injury occurs during the fall months than was previously assumed. Poison placed in envelopes has given rather unsatisfactory results. And lastly, mice can be controlled and girdled trees may be prevented if the grower is willing to take the necessary steps.

The Pear Psylla Situation

Several orchard insects have apparently found the past season very much to their liking, among them the pear psylla. Always a troublemaker, this insect was even more troublesome than usual during the summer of 1936. Perhaps the hot, dry summer was partly to blame. Whatever the reason, this pest was able to thrive and increase in numbers at an alarming rate in spite of the ordinary control measures. So numerous were these insects at harvest time in certain orchards that some grovers felt their efforts in spraying had been largely wasted. In the College Orchards, for example, the characteristic blackening of the twigs and foliage was much more in evidence than usual. And two other grovers have only recently raised the question as to the cause for so much damage.

Although less spectacular in its effect on the tree than fire blight, pear psylla is undoubtedly the most damaging pest of pear trees in Massachusetts. It has put pear growers out of business, and is responsible for much reduction in yield as well as quality. In the writer's opinion, the situation calls for a tightening up in the spray program. a more thorough application of oil in spring before the eggs are laid, will help. A better distribution and more gallons per tree is a real need in many orchards. When we realize the lengthy succession of broods and the importance of actually hitting the insect with the spray material, we will come nearer making a cleanup of the individuals present each time we spray. Anyway, there is some consolation in knowing that persistent efforts will greatly delay the "peak" of infestation. And this permits the foliage to function much more efficiently with a higher yield, better size of fruit and better quality.

Effect of Water Shortage on Nutrition of Fruit Trees

In a paper on the Status of Orchard Soil Moisture Research, J. R. Magness of the U. S. D. A. makes this statement, "The most sensitive criterion of the moisture condition in fruit trees is the number of stomata which open and the length of time they remain open. As more and more of the root zone reaches the wilting percentage on lighter type soils or approaches it in heavy soils, the rate that moisture can be supplied to the tree decreases accordingly and the daily period during which the foliage and other tree parts are functioning also decreases. When most of the root zone has reached the wilting percentage, tissues of the tree fail to become fully turgid even at night. Under these conditions, stomata may fail to open in the morning, growth of fruit ceases, and definite shrinkage of fruit may occur. Fortunately, even under such conditions fruit trees growing in the open soil will survive for considerable periods of time. Probably under these conditions a few roots that have penetrated deeply obtain water at least in sufficient quantities to prevent the death of the tree."

The above statement comes very near describing a condition in many Massachusetts orchards. Small size of fruit, internal breakdown, biennial bearing of McIntosh, inferior quality and low yields are often associated with a deficiency of water during the growing season.

Progress in Orchard Trenching

Since the September issue of Fruit Notes orchard trenches have been studied in the following orchards: Hampshire County (M. S. C.), Hampden County (Rice), Middlesex County (Drew, Saari), Worcester County (Clemons, Davis, Trask, Charlton, Calkins, Lincoln). Additional work is now under way in the two latter counties, and in two orchards in Franklin County.

Among the observations of most interest are those relating to subsoil and root distribution beneath trees affected by drought spot as compared with normal trees in the same orchard. Four such comparisons have been made and several others are contemplated.

In one Worcester County orchard we found striking evidence to show that mere depth of rooting is in itself not very important. To obtain enough water the deeper roots must penetrate a layer which is permanently moist. In the above orchard, one tree of rather poor performance had some roots at a depth of about 7 feet, in a shattered rocky strata which, even at this season, was very dry. Another tree in the same orchard, a high producer of large size apples, showed a slightly shallower root system but the subsoil was entirely different. Here was a loamy material of high water holding capacity.

Stray Thoughts

An acre of land is capable of producing only as many apples as the water supply will permit. On Massachusetts acres the potential yield will vary from nothing to perhaps 1000 bushels. In many orchards, 27 trees or less would, if given a chance, produce more good apples than the present crowded planting of 54 to 108 trees.

Overheard at a recent fruit meeting, "The orchard has grown but the equipment hasn't." How true that is about the average fruit enterprise. A sprayer that did good work when the trees were ten years old is still expected to do its stuff ten years later, with perhaps five times the area to be covered.

This question was asked at a recent study group meeting, "Is it possible to get good yields and good color, year in and year out?" And the answer is, "It depends." It depends on the water supply and on our willingness to be satisfied with fewer apples for the sake of getting maximum color. It takes good judgment to bring things into balance, to recognize the limitations of a soil, and to determine what spacing of trees will bring the most profitable returns.

A treat is in store for the finder of a McIntosh apple left on the tree until after the first of October. In our trenching operations we have enjoyed many such treats in the form of a late "drop" hidden in the grass. Here is a rare combination of an apple reaching full maturity and then being stored under almost ideal storage conditions.

A new and unusual strawberry, the Baron Solemacher, which is grown each year from seed, is said to be produced quite extensively in Germany. Seeds are offered for sale by a midwest concern.

According to the records of W. D. Whitcomb, maggot flies emerged from his cages in almost perfect accordance with the recommendations of the state spray schedule. There was a fairly heavy emergence shortly after July 10 and a second "peak" about two weeks later.

The Essay Contest, being conducted by the Mass. Dept. of Agriculture in Boston, is in full swing. Generous prizes are offered for the best essays of 500 words or less on "Why I Like Massachusetts Apples." The contest is a feature of National Apple Week and all entries must be in by November 9.

MASSACHUSETTS STATE COLLEGE
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FRUIT NOTES - January, 1937

W. H. Thies
Extension Horticulturist

Rainfall and the Fruit Crop

It takes about 11 acre inches of water to develop a 300 bu. per acre crop of apples. It would seem therefore that the normal annual rainfall in Amherst (43.49 inches) ought never to result in a shortage of water in the soil. But it isn't so much a matter of how much rain falls during the year as it is the distribution from month to month. Penetration and retention by the soil are also important factors. The season of 1936 seemed dryer than 1935. Yet the rainfall records of C. I. Guinness show a total of 48.24 inches in 1936 and only 34.08 inches in 1935. Here is a possible explanation for the greater water deficiency in 1936. We began the season with an inherited deficit of 9.41 inches from the season of 1935. In other words, the soil was actually dryer than normal. Then we received during Jan., Feb., and Mar., 1936 a total of 16.15 inches, much of which ran off because the ground was frozen. April, 1936 was only slightly above normal in rainfall while May, June and July (months of active growth and heavy water demand) brought a rainfall which was actually 5 inches less than normal. Consequently, trees planted on soils of poor water holding capacity were unable to get enough water during the summer of 1936. There was plenty of evidence of this fact in the form of internal cork in McIntosh and Cortland. Excessive Baldwin Spot in some orchards may also be attributed to a fluctuation in the water supply.

At the Rochester Meetings

I had the pleasure of attending the meetings of the New York State Horticultural Society at Rochester to tell them something of the Massachusetts plan of helping the grower to get trees true to name. There were some 200 fruit growers present and I asked if any had planted commercial orchards and found all their trees true to name. There was no response. I then asked how many had received trees not true to name. Quite a sprinkling of hands appeared over the audience. Apparently our New York brethren have not been very much more fortunate than ourselves. It is interesting to note they think Baldwin is out in central and western New York, also that some think Cortland is the best bet for a variety to replace it. (J. K. Shaw).

Do Beehives Harbor Fire Blight?

Fire blight cannot over-winter in a beehive. This much discussed point seems to have been settled by extensive experiments recently reported from New York. The longest period over which the organism was able to survive in a hive was 13 days. Usually no living bacteria were found after three days. Honey

bees were found to carry the disease from flower to flower in spring, but they were not responsible for carrying it through the winter. (R. A. Van Meter).

Strawberry Crown Injury

That first cold weather in the fall seems to have damaged strawberry crowns quite generally, not only in the North but at least as far south as Beltsville, Md. where the United States Department of Agriculture reports extensive injury. The damage appears as a browning of the cambial region at the base of the crown. No one knows how serious this condition is but such injury is common in Massachusetts. Experimental work is planned for next fall to see if it cannot be prevented by earlier mulching or by regulating the amount of mulch. (R. A. Van Meter).

A Newly Discovered Effect of Oil Sprays

In South Africa a delayed development of apple and pear leaves in spring is often a serious problem. It has long been known that deciduous fruit trees must go through a so-called "rest period" during the dormant season. The breaking of this rest period is apparently associated with low temperatures. Where the dormant season is short and the minimum winter temperatures are high, trees are inclined to be very slow in getting under way in spring. To correct this situation, M. W. Black of the University of Stellenbosch in South Africa, has been experimenting with oil sprays as a means of breaking the rest period. Apple and pear trees were sprayed with a 5% raw linseed oil emulsion from 4 to 8 weeks prior to the first opening of blossoms. Supplementary studies were also made with seal oil and with two mineral oil emulsions. He finds a marked benefit from the oil treatments in a year when delayed foliation was prevalent. The degree of response was apparently correlated with the susceptibility of the variety to delayed foliation. Here in the Northeast we don't have to worry much about such things, due perhaps to the fact that sooner or later during the dormant season fruit buds become sufficiently chilled to cause a normal development in spring.

What Makes Big, Red Apples?

R. E. Stephenson, in a recent issue of the California Cultivator, says that big, red apples, or choice fruits generally, are the product of sunshine plus conditions favorable for normal growth. Excesses or deficiencies are not favorable. There is need for balance in all things. Vigorous tree growth in early spring and early maturity of growth favor coloring. Enough soil fertility and moisture for vigor without over-vegetation gives best results. Nitrogen should be abundant in the spring but the supply should be cut off in late summer. Trees should be sufficiently open to let in light and the fruit should be thinned to about one apple for every 40 or 50 leaves. Ample moisture through the growing season is important. And after the apple is otherwise ready for the color-making process, then sunlight acts upon certain stored compounds known to the chemist as anthocyanins, to form the color pigment. The blue and ultraviolet rays are especially

effective. Clouds, haze, or fog reduce the ultraviolet light reaching the apple and are therefore unfavorable to rich coloring. Big, red apples indicate vigor and vitality just as a rosy complexion indicates health and good nutrition in the human.

Are Blueberries Self Fertile?

Can varieties of cultivated blueberries be planted in large blocks of single varieties or must provision be made for cross pollination to insure fruitfulness? Experiments carried on at Amherst during 1935 and 1936 indicate that no variety can be relied upon to set berries enough for a full crop, without cross pollination. Of the sixteen varieties tested, half can be considered as practically self unfruitful and the other half as partly self fruitful. Of the varieties recommended for commercial planting, Pioneer is self unfruitful and Cabot and Rubel are partly self fruitful. Until more information is available it seems wise to plant at least two varieties to insure fruitfulness. (J.S.Bailey).

Notes on Strawberry and Raspberry Varieties

The Howard Supreme strawberry again outyielded all other varieties in the College plantation this past season, having produced at the rate of 7,000 quarts per acre. The next best variety was Catskill with 4,500 quarts per acre. Anyone who considers Howard Supreme too dark colored, certainly will be disappointed with the color of Fairfax.

The new Indian Summer red raspberry is as early as Ranere (St. Regis) in its summer crop, but in the past two seasons has failed in Amherst to mature its fall crop before freezing weather. The season of Taylor and Marcy appears to be between Newburgh and Latham. An average of six years' yield records shows Chief to have the same season as Newburgh, instead of being an early berry as was first thought. (A. P. French).

Right and Wrong Methods with Two Small Fruits

The effects of a comparatively minor change in method is well illustrated by G. M. Darrow in the Proceedings of the American Pomological Society for 1935. Strawberry beds held over for the second fruiting season were mowed for comparison on three dates, July 1, August 1, and September 1. In all three varieties included in the test, Blakemore, Joe and Howard 17, early mowing was distinctly beneficial, increasing the yields by 22, 13.5, and 12.1% respectively. August mowing was of dubious value while September mowing was injurious to all three varieties.

Another illustration along the same line is reported by C. A. Doehlert in the Proceedings of the American Cranberry Growers' Ass'n. for 1936. In a comparison of three methods of harvesting, namely, hand picking, scooping from a standing position, and scooping from a kneeling position, he reports average yields per acre of 120.1, 94.6, and 98.7 bbl., respectively. The dropped berries collected from small measured areas showed average losses of 4.4, 21.5, and 14% of the total crop, respectively, for the three methods. There was also more tearing of the vines on the plants scooped from a standing position. And so it appears that there is a right and a wrong way of doing such simple tasks as mowing the strawberry patch and scooping up the cranberry crop.

M. F. G. A. Directors Meet with Members of College Staff

In order to become more familiar with the work of the State College as it affects the fruit industry, a committee of directors of the M. F. G. A. visited the College campus, Thursday, December 17, for an all day meeting with members of the College staff. The meeting opened with a short talk by President Baker after which each department having any contact with the fruit industry presented a brief outline of the work now under way in both research and extension. The following departments were represented at the meeting: Pomology, Entomology, Botany, Agricultural Engineering, Horticultural Manufactures, Agronomy, Agricultural Economics and Farm Management. In addition to President George Drew of the M. F. G. A., the following directors were in attendance: H. P. Gilmore, H. A. Priest, G. H. Harris, A. Pierce, C. E. Libby, and R. Fiske. The meeting served a double purpose in bringing to the attention of the growers the varied activities of the State College and a clearer conception of the services available, and second in conveying to the members of the staff, suggestions regarding additional services which the State College might render. Among the latter were requests for information on orchard irrigation, on the food value of apples, and a new account book for fruit growers. A more detailed report of this meeting will be printed in the annual report of the M. F. G. A. now in process of preparation.

Stray Thoughts

During the years 1922 to 1933, Wenatchee, Washington apple growers averaged \$1.22 per box for Extra Fancy Winesaps delivered to the shipping point. Extra Fancy Delicious averaged \$1.64, while Jonathan and Rome Beauty averaged \$0.99.

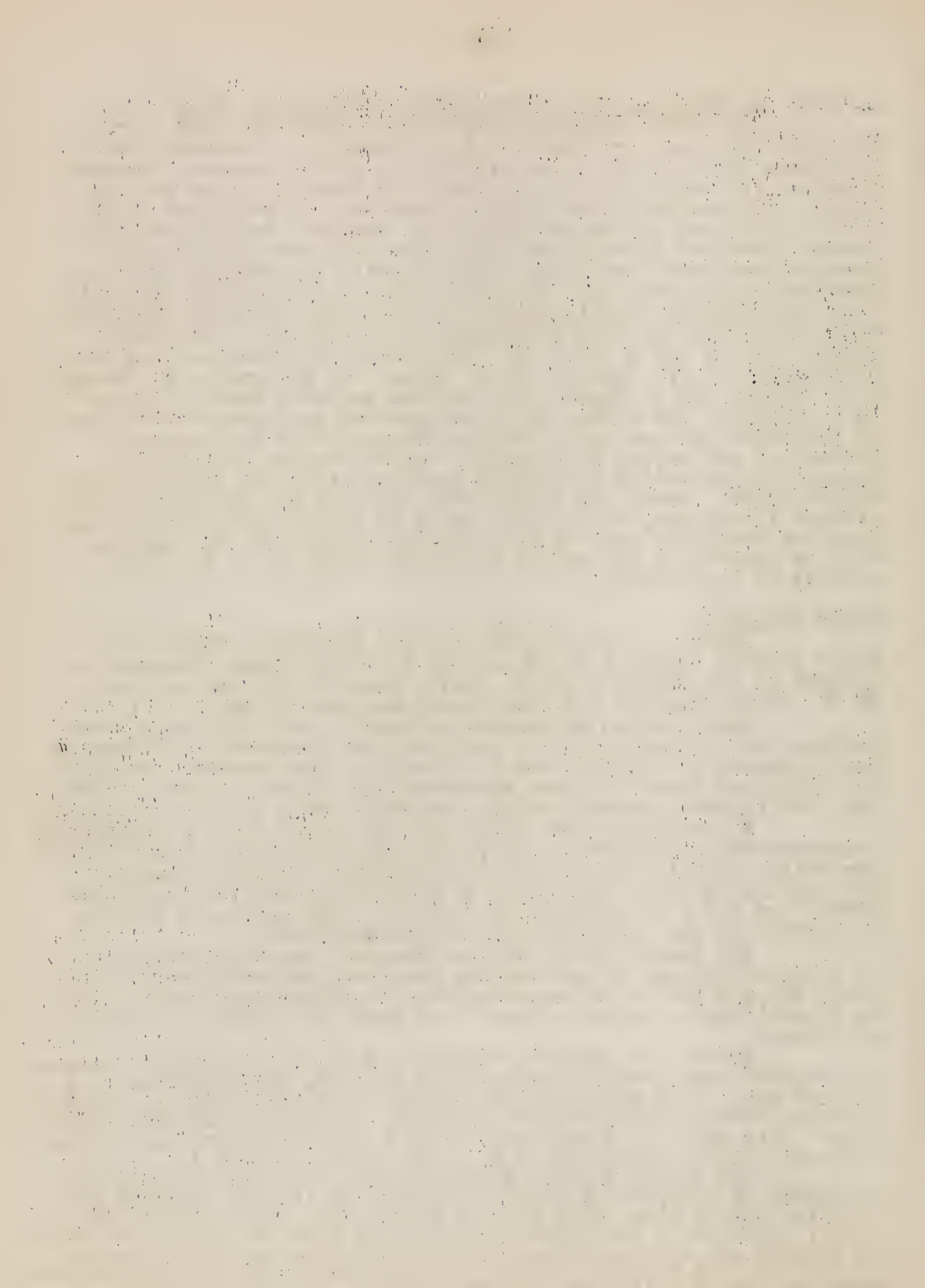
Many eastern newspapers refused to run California Fruit Exchange advertisements which contained the statement that Sunkist navel oranges are "22% richer in vitamin C than Florida oranges." The claim was made to offset statements in Florida citrus advertising that Florida oranges contain one-fourth more juice than others.

A forecast of the fruit growing industry by a responsible organization in California advises the removal of all pear trees of unpopular varieties and those of low yields or inferior quality. Such action is urged as a means of benefiting both the individual grower and the pear industry as a whole. This advice is equally applicable to the apple industry of the Northeast.

The Pacific Fruit Express Company, making provision for an increased volume of perishables from western territory, plans to spend \$10,500,000 in the construction of refrigerator cars. This is in addition to contracts made last April for 2700 new refrigerator cars.

As we look forward to another spraying and dusting season, with memories of certain shortcomings in 1936, this question is a logical one. If a change is to be made in my 1937 program, shall I stress better timing, better coverage, or shall I try other materials? This answer has been offered by a number of growers, - "The materials on the market are O.K. if you use 'em right."

The Boston Weather Bureau reports a record rainfall for the month of December of about 8 inches. If it were possible to conserve all of this water for use next summer, our orchards could easily withstand a two months' drought. A mulch of sufficient depth to smother out all vegetation is an excellent means of conserving water, since it tends to prevent surface runoff and also eliminates grass and weeds which compete with the tree for the available water.



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FRUIT NOTES - February, 1937

W. H. Thies
Extension Horticulturist

A Fruit Grower's Interest in Conservation

No one familiar with the needs of the average orchard soil can question the worthwhileness of the various practices included in the Agricultural Conservation Program. Here are a few of the evidences of a need for doing something about it: A scanty growth of grass, weeds, or other cover crop, a widely fluctuating moisture supply due in part to a shortage of organic matter in the soil, and a failure of the trees to produce good annual crops. We should recognize, of course, the limitations of each particular orchard from a soil standpoint. For example, one orchard may be desperately in need of heavy mulching. Either that or irrigation may be the one thing necessary for producing a satisfactory crop. Another orchard, planted on a naturally fertile, retentive type of soil will go on for years producing profitable crops with little or nothing in the way of soil improvement. Our interest in the improvement of the orchard soil must go beyond the present season's crop. What we do this spring to bring about more favorable growing conditions for the cover crop will have an accumulative effect. And that suggests the importance, while the trees are young, of handling the soil in such way as to insure a liberal growth, not only in the trees themselves, but in the cover crop as well. The new federal program offers considerable incentive along that line as will be noted below.

Conservation Practices Which Apply to the Fruit Farm

Following is a brief summary of the various practices of interest to the fruit grower, along with rates of payment:

1. Applying up to 3 tons of lime per acre to established sod, or in preparation for new seeding (\$4.00 per ton).
2. Applying phosphoric acid, potash, or nitrogen or approved combinations of these materials in connection with the seeding of biennial or perennial legumes or green manure crops (Rates of payment indicated below).
3. Fertilizing sod orchards with: (a) Phosphoric acid (4¢ per lb.), (b) Potash (3¢ per lb.), (c) Nitrogen, not over 24 lbs. per A. if hay is harvested, or not over 32 lbs. per acre if hay is left on land (4¢ per lb.).
4. New seedlings of clover or clover mixtures at the rate of 5 lbs. of clover seed or its equivalent per acre (\$2.00 per acre).
5. New seedlings of alfalfa or alfalfa mixtures at the rate of 8 lbs. of alfalfa seed or its equivalent per acre (\$3.00 per acre).
6. Plowing or discing under small grains, annual grasses or legumes after they have grown 2 months or have attained a growth of 12 inches, or leaving on land instead of plowing under (\$1.50 per acre).
7. Applying 2 to 5 tons of mulching material per acre, leaving on the land all materials produced in 1937 from grass legumes and cover crops (\$2.00 per acre).

Excess Trees, A Disadvantage

In a recent orchard management publication from New York State, reference is made to this statement of G. F. Warren in 1905, "One of the greatest enemies of the apple orchard is the apple tree." In an apple orchard survey made in Wayne County, N. Y., at that time it was found that orchards with less than 35 trees per acre were yielding on the average, 229 bushels per acre, while the orchards with 48 trees or more per acre were yielding only 186 bushels. Hence the striking statement to the effect that the extra trees constitute an actual enemy in the orchard. If we make due allowance for the better care which may have been given to those less crowded orchards, there is plenty of present day evidence to show the folly of retaining two or three times the ideal number of trees. The familiar admonition, "Woodman, spare that tree" was not intended for the orchardist. An acre of land can carry only a limited number of trees of a given size. And if that number is exceeded, we immediately run into a disastrous competition of the branches for sunlight, and of the roots for moisture. Both of these items tend to lower quality and raise the cost of production.

Some Strawberry Observations

A. P. French reports the Howard Supreme as outyielding the Howard 17 in the State College plantation, the two varieties having yielded at the rates of 8400 and 6350 quarts per acre, respectively. He also reports much better yields of Dorsett and Fairfax where the plants were spaced than where grown in a matted row. Each variety produced at the rate of 3700 quarts per acre where the plants were spaced to a distance of 8 inches, while in the matted row the Dorsett produced only 1700 and the Fairfax 2000 quarts. The Catskill also showed improvement where the plants were spaced, with a yield of 5200 quarts as compared with 4500 quarts in the matted row. This data seems to suggest the need of some of these newer varieties for a fertile soil and plenty of space. Otherwise the crop is almost certain to be disappointing.

Wild Bramble Eradication

Anyone interested in getting rid of a patch of wild raspberries or blackberries will do well to read a recent publication from the N. Y. Agr. Exp. Sta., by L. M. Cooley (Geneva Bul. No. 674). The author says "Farmers generally regard wild brambles as obnoxious and pernicious weeds. But besides being a nuisance, they are also a potential menace to cultivated raspberries and blackberries from the standpoint of disease and insect pests. Serious diseases in cultivated raspberries and blackberries that may be disseminated from wild hosts include the fungus maladies, anthracnose and orange rust, and the virus troubles, mosaics, leaf curl, and streaks. They also harbor such insect pests as the raspberry fruit worm, the tree cricket and the cane borer." The author reviews the methods of eradicating wild brambles, including clean cultivation, mowing, burning, and chemical treatments.

Winter Injury Following Late Stimulation

The attention of the writer was recently called to a case of severe injury in a vigorous young apple orchard in western Massa-

chusetts. A very serious cracking of the bark had occurred on the trunks of McIntosh and Wealthy trees about eight years of age. The story is briefly this. In the spring of 1935 the soil in a part of the orchard was fitted for the seeding of alfalfa by liming and fertilizing rather liberally, using both manure and a commercial fertilizer. It was then cultivated frequently until sometime in July and seeded to alfalfa. The soil is naturally moist, and as might be expected under this treatment, the trees made a vigorous growth. The unfortunate thing was that they grew too late for their own good, with the result that the first severe cold weather of the following winter found the trunks in an immature condition. Frost cracks, in some cases practically surrounding the trunk will require serious attention if the trees are to be saved. The late stimulation theory finds support in the other portion of the orchard where cultivation was discontinued early in June. Here no winter injury was in evidence. Apparently those extra weeks of cultivation in the part of the orchard seeded to alfalfa, was a determining factor, since the other items of orchard management as well as soil and varieties were similar in both cases.

Suggestions on Top Grafting

With the season for top grafting only a few weeks away, the repetition of a few fundamentals is in order. As regards the ideal time, we'd choose late March or April when growth is just getting under way, but we like to have the scions practically dormant. It is claimed that scions have been placed every month in the year and made to grow. However, the practice of cutting the scion material months ahead of the grafting operation is not advisable. The best kind of scions are cut from medium sized terminal growths of the previous season where the wood is matured and the buds are well developed. The selection of branches for the placing of scions is very important. Only vigorous, well placed branches should be chosen. If secondary, shaded branches are grafted, the scions can be expected to make inferior growth. In most cases it is possible by a wise location of the "stubs" to give the new tree a better framework than the original. It pays to use plenty of good grafting wax. None is better than the old fashioned combination of rosin, beeswax and linseed oil. For detailed directions and for additional suggestions ask the Extension Service for a copy of bulletin #117, "Top Grafting Fruit Trees."

A New Interest in Fundamentals

For several years I have attended occasionally meetings of the study groups in different counties. I have noted with much interest the type of discussion in these meetings. Growers are no longer demanding specific directions how to manage their orchards but are digging into the fundamentals of soils, physiology, insect behavior, and plant diseases. In some counties growers attending these meetings have been supplied with bulletins, reports, etc. for study and review at the meeting. This is good. One can acquire little of this basic knowledge by participating in a few hours discussion. It calls for a lot of study in the long winter evenings.

(J. K. Shaw)

Stray Thoughts

Growing apples are smaller in the evening than in the morning of the same day, say Washington State College horticulturists. Careful measurements show that apples growing in a district where the air is very dry may shrink slightly during late afternoon and evening due to the rapid evaporation of water from the leaves. This process slows down during the night and the fruit again regains its former size. This alternation of wilting and expanding tends to prevent the apple from reaching its maximum size.

An annual application of about 4 inches of mulch will keep down weeds, conserve moisture, and serve as a substitute for cultivation, according to R. J. Barnett of the Kansas Agr. Exp. Sta. As our experience with the system broadens, mulching orchards with crop residues, such as wheat straw, gives a better account of itself as a system of orchard soil management.

On a Loess soil in eastern Nebraska, roots of a 3-yr-old Delicious apple tree were found to have a lateral spread of more than 10 feet in either direction from the trunk, and a depth of more than 14 feet.

During the 12 years from 1922 to 1933 apple growers in the central irrigated region of Washington received an average of \$1.05 per box for all varieties, grades and sizes. Extra Fancy apples brought 49 cents per box more than C Grade and 29 cents more than Fancy.

Germany produced 605,000 tons of calcium cyanamid during 1935. This figure tops a progressive increase since 1931 when the production amounted to 292,000 tons.

The practice of "disbudding" as an aid in the development of a good framework in an apple tree, is not viewed with as much favor by Pennsylvania authorities as formerly. R. H. Sudds of Pennsylvania State College says, "Disbudding, or the selection of well-located apple buds to form some of the desired scaffold branches, removing all others, does not produce as good trees as desired with several of our standard varieties, particularly those which tend to make narrow crotches."

A new use is found for the moon in making illustrations such as these: The amount of newsprint paper used annually in the U. S. would make a sheet of paper 450 feet wide reaching from the earth to the moon, while the lumber used annually in the U. S. would build a boardwalk of similar length, 40 feet wide and one inch thick. And that reminds us of the many fruit trees reaching toward the moon because of crowding neighbors. If all of the excess trees in our orchards were placed end to end, perhaps they'd reach about as far.

The favorite hosts of the tent caterpillar are the black cherry, fire cherry and choke cherry. Next to these the apple is preferred. This common roadside pest of New England is discussed in very readable language by A. I. Bourne and F. R. Shaw in Ext. Leaflet No. 167, The Eastern Tent Caterpillar. This publication has just recently come off the press.

Grading of oranges by use of the X-Ray seems to be the next step for citrus packers. By means of a recently invented machine

the operator is able to see the center of the fruit as it passes on a belt between two fluoroscopes. This permits the inspection of 22,500 oranges per hour, and the imperfect fruits are discarded by the touch of a lever.

To the bewildering array of names assigned to newly created fruits, at least one nursery catalog further confuses the issue by listing the fairly well known variety of apple, Lodi, under a brand new name, Early Golden. Growers and research workers throughout the East are voicing their objections to this practice.

L. L. Davis of So. Dakota State College cautions the growers of that state to fertilize heavily and plow under cover crops systematically in order to maintain the humus content of the soil where clean cultivation is practiced. He calls attention to the fact that the American Indians were forced to leave certain areas when the organic matter of their soils, under a sub-tropical sun, became exhausted.

Talking to a group of Michigan growers, W. P. Matthews of Ohio said, "Motorists buy fruit when returning to the city; therefore, locate roadside stands on the right hand side of the roads leading to the city. Use floodlights to attract evening homegoing buyers."

Wisconsin authorities are suggesting the need for mulching strawberries before the first heavy freeze in the fall. Experiments have shown that the common ailment of strawberry plants, Black Root or Black Crown, is due to a freezing of the roots and crowns in the fall when the temperature drops to 12 to 20° F. Plants are apparently much more tender in late fall than they are in mid-winter.

Oregon Ext. Bul. 485, by Zeller and McWhorter, points out the value of "streamlining" bark wounds in a tree. In carving out the bark around an injured area, such as a canker or frost crack, the upper and lower ends of the wound should be brought to a point. Wounds left in this condition were found to heal perfectly in 3 years.

Realizing the difficulties involved in developing a "leader type" of tree, J. L. McCartney of Pennsylvania State College offers this suggestion, "It is important that the apple tree be so pruned that the "leader" will be on the windward side. Variation from this practice in windy locations will result in failure to develop a leader tree."

MASSACHUSETTS STATE COLLEGE
UNITED STATES DEPARTMENT OF AGRICULTURE
AND COUNTY EXTENSION SERVICES IN AGRICULTURE AND
HOME ECONOMICS COOPERATING

FRUIT NOTES - March, 1937

W. H. Thies
Extension Horticulturist

The Mouse Menace in Massachusetts Orchards

D. A. Spencer, District Investigator of the Bureau of Biological Survey, who has been working on the mouse problem in Massachusetts since last fall, makes these pointed suggestions on mouse control:

1. A mouse infestation is no mystery. The tree-girdling mouse builds small roadways and trails under tall grass or hay mulch. Look for these trails!
2. Tree-girdling mice burrow in unfrozen soil. They sometimes tunnel under sand, gravel, or cinders at the tree base. They often damage the tree under the wire guards.
3. Bait stations (tubes, envelopes, bottles, or cans) in the open, have not worked.
4. Place poisoned baits directly on the ground in mouse trails or drop into burrows entering the ground. Cover the trail at each baited spot with mulch, sacking, or boards. Mice will not feed under the open sky.
5. Contact your county agent for information on efficient mouse poisons.

Mr. Spencer has done much to eliminate the mystery about mouse damage. His work during the past few months will enable our fruit growers to attack the mouse problem more intelligently. Briefly stated we must first locate the mouse "runs" and then place the bait where they are, and not where we think they ought to be. Orchard areas adjoining low meadows or swamp land are highly favorable for a mouse infestation.

At this season our first job is to find out the location and extent of the season's damage, and we're seeing more of it every day. Bridge grafting or inarching with young trees must be done this spring to be most effective. And instead of waiting until summer let's locate the damage as soon as the ground thaws out, do the necessary bridging and lay plans for a real campaign against the tree girdlers next fall.

Apple Bud "Sports"

While apple bud mutations or "sports" were recorded as early as 1741, there has been a great increase in the number reported in recent years, according to Shamel and Pomeroy in the Journal of Heredity for December. About 400 apple variations have been recorded. 300 of these have been color variations, probably because variations in color are readily seen, but variations have been reported in fruit size, fruit shape, season, seedlessness, and leaf characters.

Among apple varieties grown in Massachusetts the following indicates the recorded number of red sports:

Delicious	57	Rome Beauty	21	Northern Spy	17
Oldenburg	15	McIntosh	11	Gravenstein	13
Baldwin	4	Red Astrachan	4	Wealthy	3

The frequent occurrence of red sports should encourage every fruit grower to watch for variations in his own orchard. More color or brighter color would improve most varieties, (R. A. Van Meter)

THE NATIONAL ACADEMY OF SCIENCES
OF THE UNITED STATES OF AMERICA
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20540

MEMORANDUM FOR THE SECRETARY

DATE: 1/15/71

TO: THE SECRETARY

SUBJECT: [Illegible]

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Further Evidence on Internal Cork

Papers dealing with internal cork and related troubles continue to appear. The most recent one is from Canada and reports that they are associated with:

1. High carbonate lime soils with a high pH value. Apparently this condition favors nitrification, decreases boron availability and interferes with free passage of water in the soil.
2. A high percentage of nitrogen and organic matter especially when associated with shallow soils.
3. Soil moisture fluctuations especially in association with high nitrogen.
4. Low available potash and high phosphorus-potassium ratio.

Internal cork was produced experimentally by water logging the soil in pots, thus killing the lower half of the root system. Applications of boron, either applied in solution to the soil or injected into the trees in solid form controlled the disease.

Many of these observations agree with those made in Massachusetts. We should experiment with boron next summer but it should be remembered that this material is toxic to plants and should not be used except under supervision of some one who understands its use. (J. K. Shaw)

Boron and Root Development

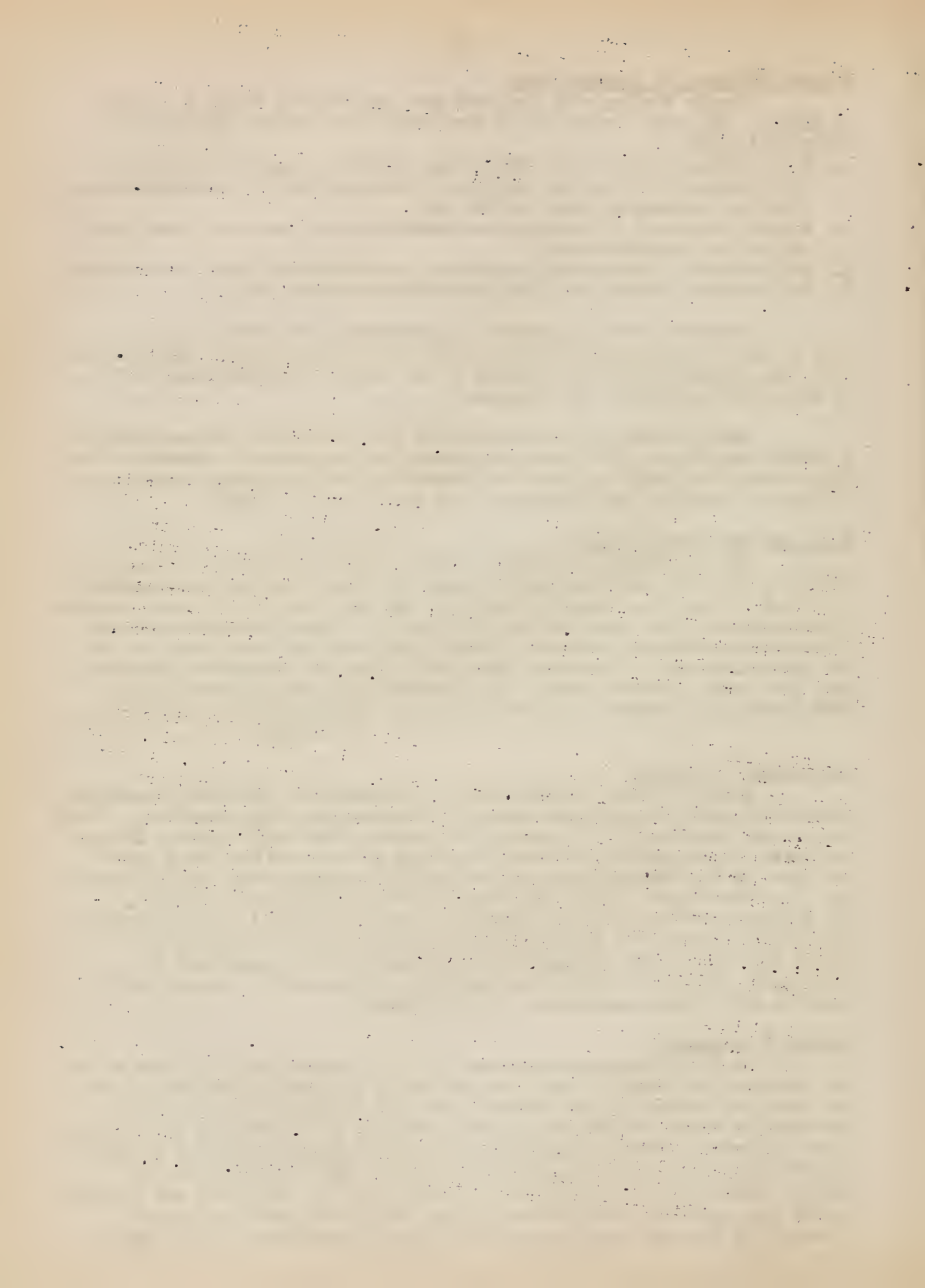
The prevalence of internal cork in certain varieties of apples in 1936 is a cause of much concern with many growers. This has been ascribed to a lack of the minor element, boron, in the tree and to the severe drought in mid-summer. There has come to my attention a German publication which brings out considerable evidence showing that when the boron supply is too low root hairs fail to develop. This must interfere with water absorption into the roots. Perhaps here is the explanation of the apparent connection between dry weather and boron deficiency as a cause of internal cork. (J. K. Shaw)

The Descent of Potash

A recent paper in the Journal of Agricultural Research gives some information as to the downward movement of potash in a clay loam soil. Three layers were considered, 0-7 inches, 7-21 inches, and 21-53 inches. Almost one-third of the applied potassium remaining in the soil had moved from the first to the second layer with no definite evidence that any had moved into the third layer. This was during a period of $6\frac{1}{2}$ years. Probably the downward movement would be greater in our lighter soils in New England. The author arrives at a theoretical fertilizer ratio of nitrogen, phosphoric acid and potash for apple trees in this soil of approximately 4.5:8:3.25. What value this ratio may have as a guide for orchard fertilization is a little uncertain. (J. K. Shaw)

Vitamin C in Apples

At the Washington Experiment Station studies have been made as to the effect of the ratio of leaf area to fruit, the size of the fruit, and the effect of storage on the vitamin C content of apples. The ratio of leaf area to fruit was effective only indirectly as it affected fruit size. A low leaf area resulted in smaller apples and a higher vitamin C content as most of the vitamin is in or near the skin. The vitamin C loss was greater when apples were stored at 40° than at 32°. Delicious and Winesap apples were studied. Studies made at our own Station show the vitamin C content of Winesap to be greater than that of Delicious. (J. K. Shaw)



The Problem of "McIntosh Drop."

A rather intensive investigation in the College Orchards in Amherst has revealed that dropping just prior to harvest varies from year to year with the same tree, from tree to tree within the same block, and from limb to limb in an individual tree. The actual cause of dropping can be directly traced to the development of an abscission zone on the spur. But the particular conditions which initiate the formation of this highly specialized layer are not exactly known. It is thought by many pomologists that environmental conditions at critical periods must exercise important influences. Thus, high temperatures during a particular period increased the dropping of McIntosh in New Jersey in 1936 over some other years. Then again, the farther south an orchard is located in the McIntosh belt, the more severe the dropping problem. Massachusetts is thus more or less favored in location. Here at Amherst we have not been able to correlate definitely any particular environmental condition or conditions with severity of pre-harvest dropping. However, we have found that seed content is important, probably as it influences the formation of vascular tissue. As a general rule, the early drops contain fewer fully developed seeds than those apples that hold on, suggesting the significance of proper and sufficient pollination of the apple blossom. To give just one example, using data from a twelve-year tree, the apples that dropped from the 10th to the 15th of September contained on the average less than five seeds. Those that dropped during the next five days revealed approximately six seeds per apple, and those that hung on until after the 20th of September averaged more than eight seeds.

In addition to greater color development, a further vital consideration is that an apple usually increases in size as long as it remains on the tree, within certain limits, of course. Thus, data from another tree in the same block reveal that those apples that hung on the tree until the last of September had increased over 35% in volume over those that dropped during the first week. Naturally, the practical importance to the grower is evident. If he could delay picking without seriously increasing the amount of dropping, the advantage would be tremendous.

(Lawrence Southwick)

Bees and McIntosh Pollination

Seven years ago this spring, a New England grower of McIntosh wondered about the importance of bees and cross pollination in the setting of a crop. And so "tents" of tobacco cloth were placed over two promising 15-year old trees just before the blossoms opened. Two similar, nearby trees were selected as checks. As a result of this test, bees were entirely excluded from the first tree during the blooming period, while a bee or two must have entered the second tent through a hole which was later discovered. In the case of the third and fourth trees, the bees were able to carry on their work without any interference. All trees bloomed heavily.

On June 11 a careful check of each of the four trees was made to determine the percent of set on each tree as well as the number of apples per spur. The results were as follows:

Apples Set per Spur

	None	1	2	3	4	Total Spurs Set	% Set
Tree #1	325	15	0	0	0	15	4.4
Inside Tent							
Tree #2	299	109	19	2	0	130	30.3
Tent (Torn)							
Tree #3	76	92	61	25	14	192	71.6
Outside							
Tree #4	105	96	56	12	7	171	61.9
Outside							

The above figures speak for themselves. Bees are essential for McIntosh pollination. Furthermore, they must carry pollen of another variety if a large crop of well formed apples is to be obtained.

Stray Thoughts

Real progress is being made in mouse control in Massachusetts orchards, through the work of D. A. Spencer of the Bureau of Biological Survey who has been stationed at Littleton during the past few months. Briefly stated, his advice is this: First, find out whether or not there are any mice in your orchard, and second, place the bait in the "runs" where the mice are actually feeding. For more detailed instructions, consult your County Agricultural Agent.

A limited number of scions of the newer, promising apple varieties are again available for distribution to interested growers this spring. This material is being passed out as a means of furthering the testing of varieties which may prove suitable for Massachusetts. Requests will be met in the order in which they arrive as long as the supply lasts. If interested, get in touch with your County Agent promptly.

In a recent windstorm two trees in a front yard in Amherst were badly broken. One of them was an old, black hearted apple tree which had long since outlived its usefulness. The other was a middle-aged maple which had been allowed while young to develop a double top with an extremely narrow angled crotch. Both of these lessons should be taken to heart by owners of old, decrepit orchards and by trainers of young trees.

A fruit growers' organization has recently been organized in Austria with an announced goal of increasing from 80 lbs. to 200 lbs. the annual consumption of fruit by the average Austrian. Austria has about 20,000,000 fruit trees, or three to every inhabitant. Yet this country does not produce enough fruit for home consumption, about \$3,000,000. worth being imported annually, mostly from Italy.

As the month of March comes to a close, a reminder on grape pruning is in order. If good grapes are desired, good pruning assumes a rank of first importance. And like other fruit plants, what we cut out is of less concern than what we leave. In the untangling of an unruly vine, we first decide which parts should remain, and then we cut out everything else.

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MASSACHUSETTS STATE COLLEGE
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FRUIT NOTES - April, 1937

W. H. Thies
Extension Horticulturist

Story of a Salvaged Tree Top

In the spring of 1933, Lloyd G. Hamilton of New Salem obtained from a neighbor the discarded top of a Kendall apple tree which the latter had just received from the New York Fruit Testing Station in Geneva. Nine stubs were grafted from this wood. One of the grafts, left undisturbed in the top of a bearing tree, bore 7 apples in 1935. The eight remaining stubs were cut rather heavily to obtain additional scion material. Part of this material was passed around in order that other growers might graft a tree or two, and thereby test a promising newcomer among apple varieties. The same thing was done in 1936, and in 1937. No less than 30 apple growers have been able to start a test of the Kendall variety from the vegetative descendants of that tree top salvaged by Mr. Hamilton in the spring of 1933. The original tree, so the story goes, has died, but its progeny will make possible an earlier decision as to the fitness of a new variety to Massachusetts conditions. It required many years for the McIntosh and the Baldwin to prove their worthwhileness. Today, through a more widespread testing, we are able to evaluate a variety in less than half the time.

Do You Make It With or Without?

An Englishman visiting this country was conducted into a "Bingo Emporium." On returning to England he attempted to describe to a friend this popular American game which he called "aw nuts." His description was somewhat as follows: "We went into a large room where there were long tables with people sitting around them. Presently a card was passed to each person. Then somebody began to call off numbers and in a few minutes one of the players shouted 'bingo' and all the rest yelled 'aw nuts!'"

When we have been making grafting wax how many times we have felt like saying "aw nuts" because the wax came out full of lumps instead of having that fine, smooth texture that we had expected. The difference between a lumpy wax and a smooth textured one is frequently due to the manner in which the mixture is cooled. If the melted ingredients are poured into cold water (45° F or less) in lots of not over one pint and allowed to cool thoroughly before attempting to pull it, a smooth, pliable wax will usually result. Pouring large quantities of the liquid into warm water and then starting to pull it before the whole mass has become completely hardened will invariably produce a lumpy product. (O. C. Roberts)

Cooperative Orchards

In order to test rather comprehensively the value of certain clonal root stocks for apple trees in Massachusetts, the Pomology Experiment Station has furnished more than 1,000 test trees this spring (mostly two-year trees) to thirteen growers scattered throughout the fruit growing sections of the state. The number of trees per grower varies from 24 to over 400 depending in each case on the wishes of the cooperator and the particular set-up available. These cooperative orchards are to be maintained by the grower on a good commercial basis. The Pomology Department will obtain yearly records of performance of the individual trees in the matter of growth. We hope that when the trees begin to bear, some records of yield may be taken with the assistance and cooperation of the growers.

We believe that these test orchards (with perhaps a few more added next spring if we have trees available) should reveal the relative values of clonal rootstocks for apple trees under Massachusetts conditions. There is a good possibility that some of these "standard" rootstocks will make better trees than the common seedling roots, and, further, we should be able to obtain a good deal of worthwhile information on the adaptability of the several "dwarfing" stocks. In addition to these cooperative ventures, similar experimental blocks have been established in the College Orchards as well as at the Waltham Field Station.

(Lawrence Southwick)

The Dwarf Stock Situation

We have had several inquiries concerning dwarf fruit trees and dwarfing stocks on which our various varieties may be budded. These are scarce and difficult to obtain. This is partly because the importation of such plant material is prohibited by U. S. Plant Quarantine No. 37. A very few stock growers in this country are trying to propagate dwarfing stocks but thus far with indifferent success. Dwarfing stocks may be imported in limited quantities under special permit "for any necessary experimental, educational or scientific purposes." Until stock growers in this country learn how to propagate dwarfing stock in larger quantities, both stocks and budded dwarf trees will be scarce. (J. K. Shaw).

Boron and Internal Cork

Did you harvest many apples last fall that were injured by "internal cork?" If so, and you know where the diseased trees are, the State College and the County Extension Service would like to know about it and try some experiments to see if the trouble can be prevented, should conditions bring it on next summer. The remedy which has been very beneficial in other regions is boron. We would like to try it on trees known to have suffered from the disease, leaving some trees as checks, because the trouble may not appear next summer. As boron improperly used is very toxic, fruit growers should not use it without expert advice.

(J. K. Shaw)

Raspberry Notes

Anthrachnose may be a serious disease on some varieties of red raspberries as well as on blacks and purples. In New Jersey it has been found that spraying the Latham variety to control anthrachnose not only increased the yield but practically eliminated all signs of cold injury during the winter of 1934-35.

A test of heavy mulch in New Jersey materially improved cane growth on red raspberries. When applied at the rate of 4-5 tons per acre, cane height was increased 30 per cent and cane diameter 15 per cent. Bigger canes means higher production. (A. P. French)

Calcium Arsenate

Calcium arsenate is an effective poison for insect control and its use eliminates load from the spray residue. The danger of foliage injury to fruit trees and some vegetables has restricted its use in many parts of the country. For several years Experiment Stations have been studying the use of calcium arsenate on apple trees and while much progress has been made toward a better understanding of the conditions in which it can be safely used, it still holds a rather uncertain position in the fruit spray schedules of most states.

A recent article by Waters and Witman of the Sherwin-Williams Research Project indicates that considerable progress in understanding and controlling the steps in the manufacture of calcium arsenate which influence the safety of the prepared product. Some of the factors which produced a safer form of calcium arsenate in these studies are: (1) Rapid agitation of the lime while the arsenic acid was being added. (2) A basic rather than acid reaction of the mixture while being agitated. (3) Temperature of the mixture at about 100° C. when ingredients

are being combined. (4) Addition of the arsenic acid to the lime slowly over a 2-hour period. (5) Use of diluted rather than concentrated arsenic acid. (6) Slaking of the lime for several hours before adding the acid.

So far as the fruit grower is concerned, calcium arsenate is still calcium arsenate, but fundamental research such as that reported above is most encouraging and it is bound to produce the desired results in time. (W. D. Whitcomb)

Rotenone Kills Bees and Other Beneficial Insects

Dusts and sprays containing rotenone, pyrethrum, or both have made a definite place for themselves in the insect control program for vegetables. However, there is still some question regarding their position in the fruit insect schedule, but each year finds some of the more adventurous fruit growers using them for one purpose or another. Pyrethrum as a dust or spray is certainly a satisfactory material for combatting leafhoppers, rotenone gives control of European red mite and either of them should be a good substitute for nicotine in aphid control.

In fact, the rotenone seems to be a little too efficient in some cases, and a recent article by R. S. Filmer of the N. J. Experiment Station reports an almost total mortality of 37 colonies of honey bees which had been exposed to a $\frac{3}{4}\%$ rotenone dust applied to large fields of lima beans by airplane. Although the beans were just beginning to bloom, the bees had been sufficiently attracted to the fields to be killed by crawling through the dust and feeding on the few blossoms of bean and other plants in the vicinity. Therefore, if you consider using rotenone spray or dust about apple blossom time for aphid, think of the bees.

At a recent Nashoba Fruit Producers meeting, Dr. Philip Garman of Connecticut Experiment Station showed that a rotenone spray gave a very satisfactory control of red mite but at the same time killed practically all of the natural enemies of the red mite, thereby accomplishing the same result at considerable expense that the natural enemies had done by themselves. The answer is not so simple as that, however, because sulfur killed the most important enemy, the Seius spider, and we don't think we can get along without sulfur.

The above reports are good examples of the reason that research workers insist on studying new materials for several years before making general recommendations. (W. D. Whitcomb)

New Methods in Apple Curculio Control

In a recent report from the N. Y. Agr. Exp. Sta. we find some new light on a troublesome pest of the higher elevation orchard, the apple curculio. A study of the life history by O. H. Hammer indicates that, as a rule, the beetles hibernate in the orchard in mulch and rubbish under the apple trees. In the spring the beetles migrate to the trees, usually during or directly after the blooming period. Unlike the plum curculio, transformation from the grubs to the adults usually occurs in the fruit. Most of the beetles of the summer brood emerge from the June drops. In some varieties, however, infested fruit does not drop. The newly-emerged adults feed on the growing fruit during late summer and early fall, causing the typical injury which is seen on the fruit at harvest time. The apple curculio has proved to be very difficult to control since most of the spray programs effective against other common insects attacking apples have not proved particularly effective. In light infestations some beneficial results have been secured from the use of heavy applications of lead arsenate in both the calyx and first cover sprays. For this particular pest, lead arsenate is recommended at 6 lbs. to 100 gallons in these two sprays. In addition to spraying, collection and prompt destruction of infested June drops is recognized as a valuable supplement to the spray. A second collection at an interval of two weeks is also recommended if the drop is rather heavy. Since many of the adults emerge from apples that still remain on the trees, careful thinning of infested fruits and destruction of these thinnings with the June drops are also recommended.

For heavy infestations it has been found that the above recommendations

would not, in all cases, give satisfactory control. For such conditions a program of spraying the ground under the trees with 25 percent kerosene emulsion has shown a very high degree of kill. This may be done (1) during the summer when the insect is developing in the fruit or (2) while the beetles are in hibernation. If given in the summer the spray should be applied as soon as the June drop is complete and before the new beetles have had time to emerge. The ground underneath the trees should be given a thorough application of the emulsion so that the June drop and any infested thinnings which have dropped to the ground will be thoroughly wet. To facilitate this, it is recommended that the grass under the tree be cut and removed before the June drop commences.

The spraying should be done with a power sprayer using regular spray-guns or spray-rods. Best results are obtained when the pressure is reduced to 250 pounds. The kerosene emulsion may be made in the spray tank by first putting in the desired amount of kerosene and then adding an equal amount of water. With the agitator in motion the emulsifier (a finely divided bentonite clay) is then slowly sifted into the tank until enough has been added to make $\frac{1}{2}$ lb. for each gal. of kerosene. After adding the remainder of the water, to obtain the desired dilution, the emulsion is then ready to use. The spray formula is as follows: Kerosene 25 gal., Bentonite clay $12\frac{1}{2}$ lbs., Water to make 100 gal.

Enough material should be used to thoroughly wet the ground and all of the apples. No part of the trunk or foliage should be sprayed. Strips of roofing paper may be wrapped around the trunk to prevent injury while the application is being made. If the application is made in the fall or early spring for the hibernating beetles, the same method of application may be employed. However, more material would be necessary to give thorough penetration of the thick mulch of hay, leaves or other debris, in order to reach the beetles. Wild apples and thorn apples adjoining the orchard should be removed so that they will not serve as natural breeding places. Observations in the Champlain Valley show little or no injury from the beetle in orchards where clean cultivation has been practiced. (A. I. Bourne)

Advertising the Apple

The State of Washington has a new apple advertising law under which a tax of two cents per hundred pounds--one cent per box--will be collected from every apple grower. The funds will be used to promote the sale of Washington apples. On March 6, the Michigan Apple Institute commenced a newspaper advertising campaign in Michigan, Ohio, Indiana, and Illinois. Posters, also, will be used carrying the slogan "For Health's Sake, Eat Michigan Apples." Funds are being raised by voluntary contributions of $\frac{1}{2}$ cent per box on the part of fruit growers. Contributions are also solicited from manufacturers, commission men and others interested in extending the apple industry. (R. A. Van Meter)

News from the Boston Regional Produce Market

In the Springfield Sunday Union & Republican of last November 22, there appeared an interesting account of the comparatively new produce market in Cambridge. Chester F. Dutton is the auctioneer in this promising venture in salesmanship. Mr. Dutton has been asked to say a few words about this. Here's part of his story, "Since starting, 99,257 packages of all varieties of fruits and vegetables have been sold. This figure does not include a few hundred tons of squash. All the New England states, New York and Maryland have sold at the auction. Offerings of apples have been heaviest. Have had some carloads and many trucks of potatoes from Maine, sweet potatoes from Maryland, also many trucks of potatoes from around Colebrook, N. H. I believe Granville, Mass. has sold more apples than any other town, with over 10,000 boxes this season. This town is 126 miles west of Boston. Here are some of the individual loads,--252 boxes of apples, 4 tons Blue Hubbard squash, 230 boxes of cauliflower. Sales have been held each Monday and Thursday this winter. The terminal charge is 2¢ per package and the selling charge is $2\frac{1}{2}\%$. Prices on same quality have equalled market quotations and have returned the growers more dollars than can be returned by the high priced, old fashioned way of selling. Any grower may get his net returns at close of sale or they will be mailed within 24 hours, if he does not wish to wait a few minutes after the sale. Things look very good for next season."

MASSACHUSETTS STATE COLLEGE
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FRUIT NOTES - May, 1937

W. H. Thies
Extension Horticulturist

Spray Lime

For the fruit grower, the term "spray lime" printed on the bag is no assurance that the contents are suitable for his purposes. An experience that we had recently will serve to illustrate the point. Needing some hydrated lime for use in the College orchards, we called the local merchant and asked him if he carried spray lime in stock. He replied that he did and that "spray lime" was printed on the bag. When questioned as to the analysis, he could find no statement as to the calcium content, but hoping to make a sale, informed us that it was high in magnesium. There-upon he was told that he could sell his lime to potato growers for it wasn't the kind of lime that we wanted for our fruit trees. When buying hydrated lime for spraying purposes, fruit growers should insist on a product that is high in calcium and low in magnesium. The better brands of high calcium spray lime have a calcium oxide content of at least 70% and less than 1% magnesium oxide. The failure of lime to produce the results expected may frequently be due to the use of the wrong kind of spray lime.

(O. C. Roberts)

Adjusting the Crop to the Tree

This expression is used by M. J. Dorsey of Illinois in an article on peach thinning printed in the April issue of the American Fruit Grower. The number of peaches of different sizes in 50 lbs. varies, according to his figures, from 500 in the $1\frac{3}{4}$ " size, to 100 in the $2\frac{3}{4}$ " to 3" size. An experienced fruit grower can make a fairly good guess as to the number of bushels which a tree of a given size should bear. Suppose we assume that a given tree is capable of bearing a 5 bu. crop. From the above figures it is apparent that the number of peaches may be as many as 2500 if they average less than $1\frac{3}{4}$ " in size, to as few as 500 if above $2\frac{3}{4}$ ". All but 1,000 peaches should therefore be removed from this tree if we want fruit at least $2\frac{3}{4}$ " in diameter. With our present heavy set of peaches in many orchards, thinning should be thoroughly done this season. Development of a large number of extra pits means a heavy drain on the resources of the tree. Harvesting the crop two or three times should not be considered as thinning. Better size and quality are almost certain to result from a liberal thinning immediately after the June drop.

Further Work on the Prevention of Internal Cork

In a recent issue of Better Fruit, H. R. McLarty and his co-workers report extensive experiments in the Northwest on the cause and control of drought spot, corky core, and related ailments of the apple. He reports rather striking benefits from the use of boric acid and concludes his article with a statement that further work is necessary to determine how often the boric acid must be applied, the relation of these ailments to a deficiency or an excess of water, etc. In Massachusetts we are making some simple tests in the use of borax as a preventative of internal cork. Tests are being made in seven orchards as follows: Two each in Middlesex, Worcester, and Hampden Counties, and one in Franklin County.

Items From Here and There

According to a report of recent investigations at the Mo. Exp. Sta., relative size of apples on a tree is determined by two factors, leaf area near the individual apple and number of seeds it contains. Observations on several hundred bearing Wealthy spurs, collected at random from the interior and exterior of a large tree producing a heavy crop, showed close relationship between weight of fruit and number of seeds and between weight of fruit and weight of spur leaves. The author states that flowers poorly situated with reference to food supply, require more efficient pollination than those more favorably located.

Productiveness and favorable physical properties of the soil go hand in hand with the rate of humus renewal, according to R. E. Stevenson, writing in the Rural New Yorker. He states that the penetration of water is slow and sometimes impossible when the humus is exhausted by too much cultivation. Soils rich in humus not only favor the penetration of rainfall but have a greater moisture holding capacity.

In a recent article in the American Fruit Grower, F. E. Gladwin states that the cross pollination of grape blossoms is brought about almost entirely by air currents. Bees or other insects play but a small part in the dissemination of grape pollen. His investigations show that grape pollen is carried by air currents to a distance of about 16 feet. This suggests a need for surrounding self sterile and imperfectly fertile varieties with good pollinators in order to take advantage of changing winds. Tests show that many varieties may be made to bear more compact clusters through the artificial application of good pollen. With the exception of the Brighton variety, most of our commercial varieties are inclined to be self fertile.

A commercial apparatus for frost protection, advertised in California operates upon the principle of moving the cold air out of the low places and drawing warm air into its place. The outfit looks like an airplane beacon or a high tension electric tower surmounted by a horizontally revolving airplane propeller driven by a motor.

From the standpoint of codling moth control, a new material known as Phenothiazine, is proving highly effective. Initial tests show that it is an efficient means of preventing "stings" and that the residue is not harmful to the consumer. But it has its disadvantages, in that it is likely to decrease the color of the fruit, may affect the foliage somewhat and is irritating to the skin of some individuals using it.

A single anther, or pollen sac, in an apple blossom may contain as many as 8,000 or 9,000 pollen grains. As pollen producers, Delicious and Starking were found to be among the highest while Cortland, McIntosh and Wealthy were in the low pollen group. Anthers in these varieties sometimes contain only half as many as in the Delicious.

A so-called "dynamite" spray is attracting some attention in the Northwest. This material is an oil-lead arsenate combination which seems to be more effective against codling moth. Its virtue lies in the building up of a lead arsenate deposit. Obviously, the use of this material late in the season greatly complicates the problem of spray residue removal.

How the past six years have reduced orchard acreage by forcing out the less profitable orchard is shown by a report from Yakima County, Washington. In 1936, this county had 47,522 acres of fruit as against 54,881 acres in 1930. A similar sifting out of handicapped locations is taking place in the Northeast.

A carbide flash gun is being used quite successfully in preventing robin damage in Michigan cherry orchards. H. A. Cardinell of Michigan State College, writing in Better Fruit Magazine, counted an average of 90 robins per acre where no exploder was in operation, whereas in two other orchards where exploders were on duty throughout the day there was an average of only nine robins per acre. The essential bird baffling features are (1) a loud report every two to five minutes and (2) a sudden motion of the device which swings around several times at each explosion.

Recent storage tests show that apples of the Richared and Starking varieties keep just as well as the Delicious if allowed to mature properly before picking. If harvested two weeks before mature, severe storage scald may follow and the fruit is apt to have a texture so tough, and a taste so astringent, as to be considered practically inedible. Unfortunately, the very qualities which are the basis of so much merit in these red sports are being used to jeopardize their future because early coloring is so often followed by early picking.

A proper selection of varieties is still the cornerstone of the fruit industry, according to C. W. Ellenwood of the Ohio Experiment Station. He states that quality of fruit, productiveness and hardiness of tree are the principal factors which enable a variety to persist in commercial orcharding. Reporting the average annual yield of 40-year-old trees of different varieties given the same treatment over a 24 year period, he finds that the yield varied from 6.6 bushels in the case of Winesap, to 21.8 bushels in the case of Northwestern Greening. Winter Banana and York Imperial were in second and third places with 18 and 17.9 bushels consecutively. Wealthy was next to the lowest with 8.4 bushels.

For the full understanding of a fruit tree, it is essential to know not only where the roots are located, when they grow, and how they react to various factors, according to W. S. Rogers of the East Malling (England) Research Station. He points out that the roots exercise important control over tree performance, including vigor, productiveness, disease resistance, etc. By the use of standardized stock kept true by vegetative reproduction, a definite standard of tree performance can be obtained.

Actual measurements of soil and water losses, taken at an experiment station in Texas, show that one extremely heavy rain swept soil away from a cotton field at the rate of 63 tons per acre and 31 per cent of the rainfall was lost as immediate run off. During the same rain, no soil was washed away from an adjoining field of grass, and only .3 of one per cent of the rain was lost as run-off. In another experiment conducted in Indiana it is shown that plant food removal through sheet erosion is as large or larger than the removal in crops. This is true even on very gentle slopes representing the average of much of the best corn land in that section. The results indicate that on slopes as low as 8 per cent, careless cropping methods will cause the loss of the entire seven inches of surface soil in 15 or 20 years.

Final signing of the \$62,500 appropriation bill to establish and equip an orchard laboratory or experiment station at Wenatchee, Washington, is the culmination of years of preliminary efforts on the part of horticulturists co-operating with various organizations, including the Washington State College. The money is to be spent to acquire a suitable site, construct the necessary buildings and buy the laboratory and other equipment needed to operate a station.

Frost service is again available in Wenatchee and Okanogan districts in Washington this spring. This will be the sixth season of frost forecasting in Wenatchee and the seventh season in Okanogan. The service also includes spray information.

A new grafting compound of considerable promise involves the combination of aluminum powder and latex, the natural sap of the rubber tree. The mixture is about the consistency of cream and is applied with a brush. Within a few minutes of application the latex solidifies into a coating of pure rubber. The aluminum tends to exclude light and thereby reduces the internal temperature of the material.

The United States is the largest producer and exporter of apples in the world according to the Bureau of Agricultural Economics. On the average during the five years 1931 to 1935, approximately 31% of the world's apple production of 500,000,000 bushels was produced in the United States. There are a total of roughly 450,000,000 apple trees in the world, 1/4 of which are in the United States.

Realizing the need of moisture at a critical period, especially in fruit and vegetable production, many ingenious devices for irrigation have been invented according to F. E. Staebner of the Bureau of Agricultural Engineering. Old automobile engines provide the power in most instances. Old pipe, used lumber and second-hand odds and ends have been utilized to build inexpensive watering devices on land not level enough for ditch irrigation. Practically all of the farmers report material benefit from being able to water their crops when they need moisture most.

The legendary origin of the name of the cranberry is said to have arisen from the shape and appearance of its flower. The blossom resembles that long-legged bird, the crane. New Englanders, noting the similarity, affixed its name to the fruit and called it the "cranberry". It is recorded in history that the early colonists sent 10 barrels of these luscious cranberries to their sovereign, Charles II. Thus nearly 300 years ago our forefathers gave testimony of their high regard for the berry which grew in the lowlands of Cape Cod.

Apple leaves are likely to be more active during the relatively cool days of early spring and late fall than during the very hot days of mid-summer, according to a news release from the Maryland Extension Service. While the high temperature in itself may not be injurious to leaf tissues, it probably exerts an influence through its effect on transpiration. The loss of water from the leaf on cool days is only a small fraction of that lost when the atmosphere shows a high evaporating power. This suggests the need for developing a large leaf area on the fruit tree in early spring if good production is to be maintained.

Raspberry mosaic is one of the most likely causes of crumbly berries in the Latham variety. Latham is one of the sorts which is quite resistant to mosaic. Plants of this variety will tend to produce a fairly good crop, even though they are infected by that disease. A report from New York State, however, points out the connection between mosaic and berries which tend to crumble.

Japanese walnuts have far out distanced their English cousins in a six year race at the Mt. Carmel (Conn.) Expt. Sta. Several of the oriental hybrids were planted beside the English variety. They grew with unbelievable rapidity and some of them are now almost 15 feet tall. They are not only hardy, withstanding the severe temperatures of the past two winters, but they are fine shade trees and produce good nuts. English walnut trees planted at the same season have reached a height of about 6 feet.

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FRUIT NOTES - June, 1937

W. H. Thies
Extension Horticulturist

A Rainy June and Its Effects in the Orchard

For three consecutive months the rainfall in Amherst has been above normal. Records show a total since January of 26.83 inches which is nearly 6 inches above normal. May and June alone contributed an excess of 4.64 inches. During May the rainfall amounted to 6.09 inches while June brought 5.72 inches. The normal rainfall for the two months is 3.63 inches and 3.54 inches respectively. How different is this record from that of 1936, when May and June brought a shortage of more than 2 inches and July added to our deficit nearly 3 inches more. Then we were observing actual drought conditions in many orchards. Now we are trying to avoid getting mired while fighting the ever present menace of scab. Then we were wondering about irrigation. Now we have enough water, and some to spare. Aside from the scab problem (and O. C. Boyd reports 10 infection periods between May 6 and June 22) what are the probable effects of all this water on tree behavior? A few guesses may be in order.

Orchards on deep, well drained soils are faring very well. The excess of water drains away and the roots do not remain submerged because little water logging occurs. Orchards on the more porous, droughty soils are also making a good showing, assuming of course an ample supply of plant food elements. Trees on such soils are quite contented when the water supply is replenished every week. Their record for the season however, will depend very largely on the rainfall during July and August. If we have a late season drought, we may look for early dropping of McIntosh and perhaps some pitting of Baldwins. The same may be true of other orchards underlain by hardpan where the soil at this season appears to be too wet. A high water table in early summer results in a shallow root system, which leaves the tree "high and dry" during an August drought. As regards the set of fruit buds for 1938, there is some evidence to show that hot, dry weather during June is more conducive than cool, rainy weather. And if next spring should bring only a moderately heavy bloom, that will be an advantage, since excessive blooming tends to exhaust the resources of the tree and encourages biennial bearing. Seldom have we seen so heavy a growth of grass in Massachusetts orchards. This is due in part to a more general broadcasting of fertilizers. Enough water for both the tree and the grass is also a factor. The additional grass thus being grown in the orchard, along with a generally heavy hay crop throughout the state, will make it somewhat easier this year to add the tonnage of mulch material so much needed in the average orchard.

A New Idea in Orchard Mouse Control

Donald A. Spencer of the U. S. Bureau of Biological Survey, offers the following timely advice regarding mouse control in Massachusetts orchards: "A late spring coupled with damp weather has resulted in an unusually heavy stand of grasses in most orchards. This condition is most favorable as food

and cover for tree girdling mice. Their hidden runways will be everywhere in the orchard where this grass cover exists, provided of course that mice are present. Experience has taught us that we must locate those runways for placement of poison baits if our control of this tree-girdler is to be successful. This is a task for the fall season, so we suggest the following program:

Meadow Mice can be drawn in from a rather large area in the orchard by making suitable nest sites for them. Hay mulching about the base of a tree will serve this purpose. Where this type of orchard culture is not employed, make small haycocks with a couple of forkfuls of mown grass, approximately one to each tree. This haycock should be thrown on and in a stand of grass in which mice live. It need not be near the base of the tree. In fact it will be much more useful if this haycock is placed at the side of a rock outcrop, or across a rut or furrow, or on the lower side of a terrace. Be sure to construct such haycocks along all drainage ditch banks at about 25 foot intervals, and in all marshy areas within the confines of the orchard. They need not be placed before the latter part of August but must be in place at least one month before the poisoned bait is distributed.

You gain one big advantage by establishing Mouse Concentration Stations this summer. It will be a simple matter next October after the apple crop has been picked and windfalls gathered, to check each of these mulch piles and drop poison bait in any mouse runway that occurs there. These mulch piles protect the bait from birds and other beneficial wild life and save many hours of labor scratching about through the grass trying to locate mouse runways. For information on the new mouse control baits consult your County Agricultural Agent next September."

Early Thinning Pays

There seems to be more interest in early thinning of apples and peaches than for many years past. Many growers who formerly waited until the June drop was over are learning from experience the profitableness of getting the extra fruits off the tree before the first of July. However, July thinning is much better than none at all, even on early varieties, as the following example will show. A few years ago two heavily loaded Yellow Transparent trees were selected for demonstration. Both trees were vigorous and rather brushy. On July 5 one of the trees was thinned thoroughly. Apples removed--3600. Time required - 4 hrs. On July 29 the apples were picked from both trees, sized, packed and sent to Boston. The fruit on the thinned tree was not only larger but it ripened earlier and more uniformly. These returns were received:

Size (inches)	No. Bu. Thinned Tree	No. Bu. Unthinned Tree	Average Price per Bushel
2 3/4	1	0	\$1.07
2 1/2	7	2	.93
2 1/4	5	8	.38
2	1	2 1/3	.00
	<u>14</u>	<u>12 1/2</u>	

Total returns: Thinned tree, \$9.48; unthinned tree \$4.90. Difference in favor of thinned tree \$4.58.

Late Summer Meetings

July and August will again offer several opportunities for getting out and seeing how other folks are tackling their fruit growing problems. Following the regular Farm and Home Week fruit meetings in Amherst, July 27 and 28, at least three other meetings are planned for August as follows: August 5,

Fruit Growers' Field Day in Granville sponsored by the Springfield Fruit Growers' Association and Hampden County Extension Service, August 11, M. F. G. A. meeting at the orchard of George Drew in Westford. A third get together involving a tour of Franklin County Orchards will include growers from all of the Connecticut Valley Counties, Franklin, Hampshire and Hampden. The date of this meeting has not yet been set.

Relation of Bloom and Set of Fruit

When one tries to determine the relation between the number of blossoms on a fruit tree in May and the number of fruits in July, he very soon reaches the conclusion that the two are in no way related. How often we've heard a remark like this, "With such a wonderful bloom, I looked for a heavy crop, but the apples seem to be few and far between". This season has done much to demonstrate the importance, not only of bees in the orchard, but of suitable weather for bee flight, and of ample facilities for cross pollination. It is safe to say that the bees had less than one full day in which to pollinate some of the McIntosh orchards in Massachusetts. Rain and cold weather kept them inactive during much of the blossoming period. And under such conditions it is highly important that the pollen for use in the McIntosh trees be close at hand. Where good pollenizers stand either adjacent to, or not farther than one row removed from the McIntosh trees, the set of fruit seems on the average to be much better this year than in solid McIntosh blocks. It is one thing to have fruit trees show a mass of pink or white at blooming time, and something quite different to have the half dozen essentials for a satisfactory set of fruit.

The Spray Injury Situation

The absolute limit in chance taking is to be found in the elephant discovered leaning over a cliff, with his tail wrapped around a daisy. Some fruit enterprises rest upon almost as shaky a support. The owner gambles not only with the vagaries of the weather but with a frosty location, a droughty soil, and sometimes with unknown spray materials. And all too often a grower gives his fruit problem only a superficial scanning instead of getting at the underlying facts. The present spray injury situation offers a good example. More foliage injury has appeared in apple orchards this season than in many seasons past. The better grower is willing to admit that he may have sprayed when the temperature and humidity were too high. His inexperienced neighbor prefers to blame the condition on the material used, little realizing that an earlier scab infection or a starved condition in the tree renders foliage much more susceptible to spray injury. O. C. Boyd lists the following factors as contributing to spray injury, in approximate order of importance: (1) Extremely tender foliage that developed during the unusually cloudy, damp weather. (2) Cloudy, muggy, weather that was not conducive to drying of sprayed foliage. (3) Low vigor of tree. (4) Unusually hot, humid period from May 29 to June 1, prior to, during or following which many growers sprayed either with lime-sulfur alone or with lime-sulfur and lead arsenate. (5) Necessity of using lime-sulfur in cover sprays in order to cope with the unusual scab situation. (6) Holding the spray nozzles too close to the trees in some orchards.

Strawberry Shortcomings

On the whole the strawberry crop in Massachusetts has been very satisfactory. Here and there, however, we have observed instead of an abundance of potential shortcakes one or more of the following shortcomings: (1) A densely matted row which resulted in too many decayed berries; (2) The opposite condition where plants are too far apart owing to a lack of mulch last fall or to the drouth last summer; (3) An abundance of leaf spot which gives evidence that a highly susceptible variety is being grown in place of certain standard varieties like Howard 17; (4) A woody planting in which many of the woods are unwanted strawberry plants. This last condition is especially important in such heavy feeding varieties as Dorsot and Fairfax. Spacing of the runner plants in late summer is essential with those varieties if best results are to be obtained. The above suggestions are made merely to call to the grower's attention the need for observing at harvest time certain fundamental principles in strawberry culture, for after all the harvested crop is the best indicator of the success or failure of our cultural methods.

An Unwelcome Midsummer visitor

The Apple Maggot or Railroad Worm has again made its appearance in Massachusetts apple orchards. In looking for the adult flies it is well to look first at such ^{more} summer varieties as Astrachan, Yellow Transparent, etc., since the flies ^{are} inclined to make their initial appearance in the trees of early varieties than they are in trees of winter varieties. A few flies were reported during the first few days of July. It is safe to say that the Third Cover Spray (about July 10) will be well timed for the average orchard. For the later appearing flies a second application of lead arsenate (2 lbs. in 100 gallons) should be made about July 25 except on early varieties. If dust is used three applications are recommended at ten day intervals beginning about July 10. In our efforts to control this summer visitor, we should not neglect to take care of all apple trees within infesting distance of the orchard (about 200 yards). As a supplementary control measure all maggot infested drop apples should be gathered up at least once a week and disposed of by feeding to live stock or emptying on soil previously saturated with crank case oil. The outstanding results which Massachusetts growers have obtained by using the above control measures prove conclusively that the apple maggot or railroad worm can be controlled except where the environment is decidedly unfavorable.

Twilight Glimpses

Twilight meetings of fruit growers have been held in the following counties this summer; Worcester, Middlesex, Franklin, Hampshire, Hampden, Bristol, and Plymouth. An additional meeting is scheduled for Norfolk County within a few days. More than 20 such meetings are being held this season in Worcester County alone. The attendance has been extremely gratifying. The average number of growers attending the first thirteen meetings in Worcester County was 35. It has been a common thing for an occasional grower to drive as much as 30 or 40 miles to attend one of these evening sessions. Comments from a number of growers lead us to believe that meetings of this type are very much worthwhile.

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FRUIT NOTES - July, 1937

W. H. Thies, Extension Horticulturist

Cooperative Clonal Stock Orchards

There have been planted in the state this spring 21 orchards of trees of our common and some new varieties on clonal or asexually propagated stock. Many of these stocks are more or less dwarfing to the varieties budded on them. The purpose is to learn what are the effects of these stocks on the various varieties and whether these stocks have any value in commercial fruit growing. The orchards vary in size from ten trees up to nearly four hundred trees. The distribution of the orchards by counties is as follows: Hampden 6; Hampshire 7; Middlesex 3; Worcester 5. We will have several hundred trees available in the spring of 1938 and perhaps in 1939. We will be glad to hear from any grower who would be interested in planting some of these trees. It will take some time to get results but they should be interesting and valuable.

J. K. Shaw

Emergence of Apple Maggot Flies in 1937

On July 20, approximately one-third of the expected number of flies had emerged in cages at Waltham. Probably the actual maximum number of flies emerging in one day had not occurred but it promises to occur before July 25, and the period of greatest emergence will be from July 16 to 25. In general, the appearance of the flies this year is very similar to that in 1935, and it should be considered normal. The first fly was found on June 28 but appreciable numbers were not collected until July 11. As in other years, the greatest early emergence took place in light, cultivated soil exposed to the sun, and the least emergence has been in shaded sod. The spray dates recommended in the College schedule are very timely this year and should be followed. Late varieties should be sprayed the week of July 26. Observations in recent years in orchards interplanted with early and late varieties indicate that the maggot can be more satisfactorily protected in the late varieties by spraying the early varieties just after the fruit is harvested. Apparently, the flies stay in the trees of the more attractive early varieties for some time after the crop has been harvested.

In many orchards in the eastern part of the State, the white apple leafhopper was more abundant on July 1 than it has been in the past 10 years. With normal conditions, the infestation by the second generation promises to be extremely heavy. If this occurs, foliage injury, fruit spotting, and excessive late drop due to leafhopper attack will probably warrant more spraying about September 1 than usual. Nicotine sulfate and soap, or pyrethrum extract sprays, will control this pest and a pyrethrum-clay 30-70 dust or a 2% nicotine lime dust will be effective.

W. D. Whitcomb

The Rose Leafhopper

Apparently the rose leafhopper is much more abundant than usual in many orchards this season. This species is primarily a pest of potatoes but is also found on apples where it usually confines its attention to nursery trees or young non-bearing trees in the orchard. On older trees it attacks the terminal leaves, causing them to curl or become cup shaped. Badly injured leaves turn a pale yellowish green and later brown. It is seldom abundant on apples, being

overshadowed by the more serious white apple leafhopper. The rose leafhopper is green in color and, like the white apple leafhopper, has two generations a year. It passes the winter as an adult and begins feeding in the spring on various grasses, weeds and vegetable crops. Later it goes to the apple where the maturing nymphs are found usually in late June and early July. It is normally somewhat later in its development than the more common species and, due to the overlapping of stages, hoppers of all ages may be found on the trees at the same time. It usually leaves the apples in midsummer and migrates to beans, clover, potato and other field crops, so that the late season brood is not often abundant in apple orchards. It is seldom abundant enough to require a special spray. The sprays recommended for control of white apple leafhopper will also be effective for this species.

A. I. Bourne

The Newer Strawberry Varieties. Some Field Notes Based on the 1937 Crop.

Catskill. Large size, medium attractive red color, but rather rough surface with high production and firmer than Howard 17. Very vigorous grower. This variety will doubtless find a place in commercial plantings because of its production and attractiveness in the package.

Dorsett. Attractive bright red, smooth, firmer than Catskill, large size early in the season, excellent quality, of doubtful commercial value for the average grower because of rather low production.

Fairfax. Large size, firmest of all varieties, rich vinous flavor, but too dark for present market demand and rather low in production. This variety should be particularly valuable for the home garden and for canning. In our opinion both Dorsett and Fairfax are superior to Marshall in quality.

Thompson Late. Materially later than Aberdeen, bright red berries, but very rough in appearance and not above average quality, production satisfactory. However, this variety leaves much to be desired in a good very late berry.

Bellmar. Plant growth too vigorous, berries too small and too poor quality, production much too low to be of commercial value here.

Blakemore. Early, but production too low under Massachusetts conditions.

Fugeima. This Japanese variety has no place in the commercial bed. The berries are large, rough, very seedy, oblate in shape, unattractive and rather poor quality. It is doubtful if even the amateur will find this variety more than a novelty.

Fruitland. A midseason variety of moderate growth, medium size, irregular shape, light color, juicy but soft, quite sour and poor quality.

Narcissa. Medium, too small in size, dark color, but firm, pleasant flavored and good quality. Of very doubtful commercial value.

Orem. Moderate grower, fruiting rather late with large irregular wedge shaped berries, light color, unattractive, firm but with a hard core and only fair in quality.

McAlpin. Vigorous grower, late, large but irregular light colored berries, which are unattractive, soft and only fair in quality, rather light production and very serious leaf spot even in our sprayed bed.

A. P. French

Some Fertilizer Effects in The Strawberry Planting

Most growers of strawberries are familiar with the fact that the liberal use of nitrogen, particularly in the spring of the bearing year, tends to make the berries soft and more subject to rot. Two other interesting effects of nitrogen are brought out in a recent publication, "Strawberry Fertilizer Studies in Maryland" (Bul. 403) by Whitehouse and Schrader. According to these workers, the fertilizer applied at the time of planting should contain a quickly available source of nitrogen, such as nitrate of soda, in order to stimulate an early

development of runners, since the early runner plants are more productive than later plants. Midsummer applications of fertilizer will be of value on plantings which have not grown well, but not on vigorous plantings. Furthermore, an excessive growth of foliage tends not only to increase the size of berries but delays their maturity. Under Maryland conditions, an application of fertilizer in late summer may be more desirable than an application the following spring. All things considered, the objective of the strawberry grower should be to treat the soil in such way that plenty of vigorous, early runner plants are developed. Such plants with their large leaf area in the fall preceding the fruiting season will insure a crop of marketable berries without spring fertilization, assuming of course that the runner plants are properly spaced and the planting is thoroughly mulched.

The National Apple Crop

Quoting from the July Report of the N. E. Crop Reporting Service, "The outlook for apples in New England on July 1 was for a crop totaling 9,230,000 bushels, compared with 5,270,000 bushels harvested in 1936, and 8,723,000 bushels the five year average, 1928-1932. For the United States the apple crop on July 1 is estimated at 194 million bushels which is 65% larger than the unusually small 1936 crop that totaled 118 million bushels. This crop prospect is also 18% greater than the five year average production. Larger than average crops of apples are indicated for all sections of the country except the western states. Cool rainy weather during blossom time interfered with pollination in important areas of western states and reduced the set of fruit to some extent. Present conditions in the eastern apple states outside New England forecast a crop over double the very light crop harvested last year, and 37% greater than the five year average."

For the New England states the total apple crop is estimated at 73.1% of normal. Last year it was 43.8%. Vermont shows the largest gain over last year with 83% as compared with 19%. The estimates for the other New England states are as follows: (The figure for 1936 appears in each case in parentheses) Me. 73 (40), N.H. 77 (40), Mass. 70 (45), R.I. 65 (60), Conn. 73 (60).

What is Rotenone?

A few years ago a new word appeared in the reports and lectures on insect control. It was spelled R-O-T-E-N-O-N-E and pronounced row'-tee-nōn. The many amazing insecticidal qualities which were credited to it sounded like another fairy tale even in this age of scientific discoveries, and the skeptics were justly skeptical in their skepticism. However, continued studies have proved most of these fairy tales to be true, and unquestionably rotenone has now established a place for itself in our insect control program. Chemically, rotenone is a white crystalline substance which is found in certain plants and may be compared to the nicotine in tobacco. It is found in largest quantities in the roots of woody plants of the Derris genus which grow in the Federated Malay States in Southern Asia. Another plant which contains considerable rotenone is called Lonchocarpus nicou. This grows in South America and is commonly known as cube in Peru; timbo in Brazil; nekoe in Dutch Guiana; nicou in French Guiana, haiari in British Guiana, and barbasco in the Spanish speaking countries. In the United States a wild leguminous plant known as Cracca virginiana and called Devil's Shoe String has been found to contain rotenone but not in sufficient quantities to make the commercial use of this plant profitable. Consequently, all rotenone for insecticide purposes is now imported into the United States. When grown for commercial purposes, the plants are propagated from cuttings and after two to four years the roots are dug, air dried, and baled.

The active ingredients of these plants were originally known as fish poisons and were used as such by the native Indians. By pounding the roots in a small quantity of water a milky solution was produced which, when placed in a pool, brought the fish to the surface in a paralyzed condition. The Indians ate those fish with no ill effects, and it was thus discovered that the rotenone was poisonous to cold blooded animals but relatively harmless to man and other warm blooded animals.

Rotenone is available in insecticides as both sprays and dusts. For spraying, the rotenone is extracted and emulsified in a liquid. The rotenone content of these extracts is about 1 per cent and this is generally diluted in water at the rate of 1-100 to 1-800, depending on the pests. These sprays kill worms, moths, and beetles, as well as plant lice, and at the greatest concentration give very good control of the red spider. They constitute one of the best general purpose insecticides available and are especially satisfactory for use in the greenhouse. An effective spray can also be prepared by putting 4 to 6 pounds of powdered derris or cube root in each 100 gallons of water. This requires the addition of a wetting agent such as sulfated alcohol, but prepared powder is now available for this purpose. Sprays of this kind are more adapted to outdoor conditions where dusting equipment is not available. Rotenone and other active ingredients of derris and cube are broken down by light and, therefore, are effective only 4 or 5 days after application. If continuous protection is necessary, they should be applied at least each week, or more often if washed by heavy rains. It has also been found that the effectiveness of rotenone is decreased greatly by alkaline materials. Therefore, it should not be used with lime as a carrier for the dust, nor in a spray containing lime such as Bordeaux Mixture or Lime Sulfur. Sulfur, an acid forming material, can be used to some extent since it appears to activate the rotenone but at the same time shortens its period of effectiveness. The most satisfactory carriers for rotenone dust are clay, gypsum, or Fuller's earth. These are used by manufacturers and generally are available where materials for home mixing are supplied.

W. D. Whitcomb

Stray Thoughts

Quoting from Connecticut Pomological Pointers, "The development of European Red Mite has been very slow this year due to unfavorable weather and abundance of natural enemies. Mites have been conspicuous by their absence in most orchards visited. If they do develop, it is difficult to see how they can be of great importance before August."

In order to effect pollination, assuming a colony of bees to the acre of orchard, each bee in a 15,000-bee colony would have to visit 40 to 80 blossoms, while a bee in a 25,000-bee colony would have to visit only 15 to 30 blossoms, according to Tennessee Horticulture. With an average of 7,500 blossoms per tree, there are between 200,000 and 400,000 blossoms per acre. The normal hive in spring may contain from 15,000 to 25,000 bees, but it is estimated that 10,000 inside workers are required to "do the housework," leaving only 5,000 of a 15,000-bee colony to be spared for field work. With a slightly larger colony, say 25,000, there would be around 15,000 bees for field work.

A New York apple grower submitted this problem to the Rural New Yorker, "I am having quite a bit of difficulty in getting color on McIntosh. I am planning to apply 10 lbs. of potash per tree, and the same amount of nitrate of soda. The trees are 25 years of age in sod." H. B. Tukey of Geneva replied in part as follows, "Although there is an old saying that 'potash paints fruit' yet there is no experimental evidence to support this statement. Color of fruit is

dependent upon maturity and sugar content of the fruit, plus light. That is, unless there is a vigorous leaf growth and unless the foliage is manufacturing sufficient sugar to supply each individual fruit on the tree, poor color will result no matter how good the light. It is for this reason that an overloaded tree often produces under-colored fruit. It is also the reason why a light crop of fruit is often highly colored. As one of New York's best fruit growers recently stated, 'The trees that produce the best colored fruit are the ones that are in good vigorous condition!'

Each year more fruit and truck farmers in the humid eastern states are supplementing rainfall with irrigation, according to F.E. Staebner, Bureau Engineer in charge of irrigation research in the eastern states. "Supplemental irrigation," he says, "is good insurance for fruit and truck crops." Five humid states, typical of those in which farmers are finding irrigation a help when rainfall is insufficient, and the number of acres irrigated in each, according to a 1936 report of the Am. Soc. of Agr'l. Engineers, are Ohio, 10,100, Michigan, 7,600, New Jersey, 6,000, Virginia, 3,600, and Maryland 1,150. If we could be certain of getting at least 4 inches of rainfall per month, with not to exceed two weeks between the replenishing rains, there would be little need for any thought of irrigation in Massachusetts, even on the lighter soils. A combination, however, of poor distribution of rainfall and poorer retention in some of our soils, should stimulate serious thought on the matter of irrigation insurance. Water is a limiting factor in our average orchard at least one year in three.

An insect somewhat resembling the Buffalo Tree Hopper, but bearing a rhinoceros-like prong on its head, was recently sent to the State College for identification. With the aid of A. I. Bourne, the "critter" was found to possess the formidable name *Glossonotus crataegi*. It has been reported as being seen on hawthorne, quince, crabapple, pear, and the cultivated rose. The quince may be its favorite host plant since one authority says this species of tree hopper is fairly common in the Northeast wherever quinces are grown.

The "thin wood" method of pruning apple trees was discussed by Prof. V. R. Gardner of Michigan at one of the Farm and Home Week meetings in Amherst. Briefly stated, branches whose 4-yr.-old wood is not more than $3/8$ of an inch in diameter are inclined to bear small, poorly colored fruit, and should be removed. This means pruning out more of the shaded, drooping branches, and fewer in the top of the tree. The theory underlying this method is sound. The Michigan folks have labelled a kind of growth which many growers have observed for years. Pruning out this kind of wood is nothing new. The question which we must decide is how much wood of a more vigorous nature, if any, can we profitably remove.

The summer meeting of the M.F.G.A. at the orchard of George Drow in Westford on August 11 will bring together fruit growers from throughout eastern Massachusetts. Visitors will see a good orchard and a good storage, to say nothing of listening to a good program.

There has been more evidence of tree climbing in Massachusetts apple orchards this summer than for many summers past. The reason? To check on the kind of spray coverage in the top, and to observe the extent to which scab spots have been burned out. Gymnastics of this kind are very much worth while when they reveal how poorly the top of the average tree is being covered, in time to modify the spraying technique.

MASSACHUSETTS STATE COLLEGE
UNITED STATES DEPARTMENT OF AGRICULTURE
AND COUNTY EXTENSION SERVICES IN AGRICULTURE AND
HOME ECONOMICS COOPERATING

FRUIT NOTES - October, 1937

W. H. Thies
Extension Horticulturist

A Beauty Parlor for Apples

The problem of getting color on apples that are shaded is common to all orchards. Frequently, perfectly good apples free from blemishes have to be classified as B grade rather than Fancy simply because of lack of color. Experiments recently conducted by the Pomology Department indicate that exposure of green apples to sunlight after they are picked will materially increase the amount of red color. The idea that sunlight is necessary in order to get color on apples is not new, but the problem has been to get this color without also getting damage from sunburn. Exposure to direct sunlight for the length of time necessary to develop the red color will result in considerable sunburn on the apples. In these experiments apples were covered with cheesecloth. This deflected some of the rays which produce sunburn and yet permitted enough to reach the apples to promote coloring.

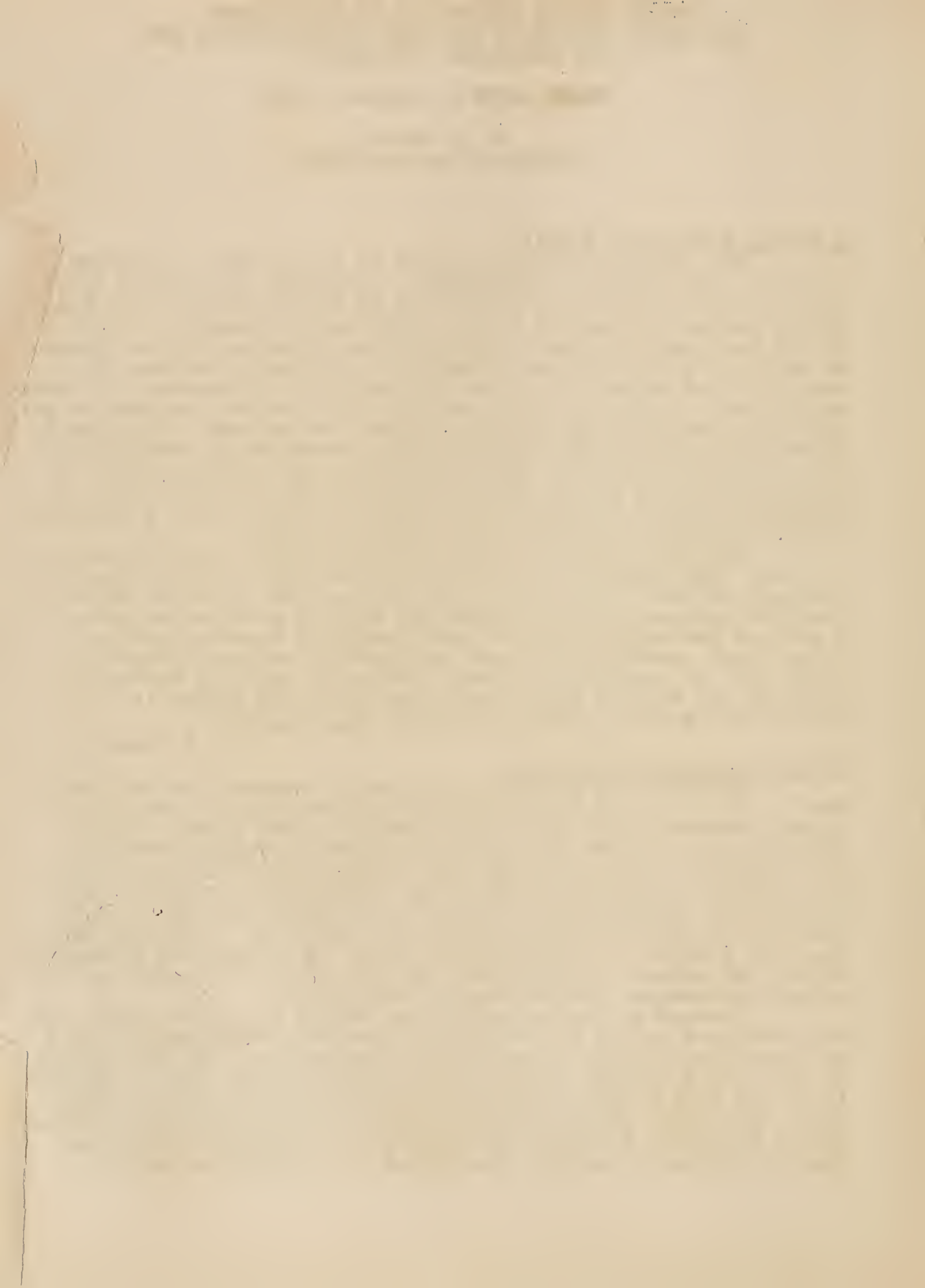
McIntosh apples from the College Orchard that were entirely green when placed in the coloring frame with a single layer of cheesecloth over them acquired better than 50% red color after 30 hours of exposure to bright sunlight without evidence of sunburn. A similar lot exposed for the same length of time without the cheesecloth covering developed considerable sunburn. Further study will be necessary to learn whether or not this method of coloring can be used economically and also what effect it will have on the keeping quality of apples thus exposed.

O. C. Roberts

Growth Promoting Substances

During the past year considerable interest has been manifested in the field of "artificial" root stimulation, especially as regards dormant cuttings of deciduous trees and shrubs. This field began to absorb the talent of numerous research workers following the much advertised work carried on at the Boyce Thompson Institute in Yonkers, New York. Commercial chemical concerns immediately recognized an opportunity to "cash in" and began to manufacture and distribute various preparations. Hormodin, Root-Gro, and Auxilin are preparations now on the market and presumably others may appear if the demand, created either by results or plain high-powered advertising, is sufficient.

Various chemicals, consisting mainly of Indole-Acids, have been utilized and up to the present time the Indole-Butyric Acid has been largely used in commercial preparations. At the College we have tried various of the basic chemicals alone and in combination, and with varying degrees of strength and periods of exposure. This past summer, working mainly with dormant apple cuttings, we got very poor results. In some cases, it seemed that a particular treatment may have benefitted root formation, but the



experiments as a whole were discouraging. Workers elsewhere have experienced similar failure of these substances to aid root initiation and growth in those economically important deciduous types that have always resisted propagation by cuttings. Hence, for the present at least, trees such as apple and pear will continue to be propagated in the nurseries by the usual methods of budding and root-grafting. Of course it is possible that further developments may demonstrate the feasibility of propagation by cuttings of apples, pears and others but just now we can say that root-hormones are not of practical value here.

Lawrence Southwick

Borax and Internal Cork

Last spring several tests of Borax as a preventative of internal cork were made in orchard in various parts of the state, also several trees were treated at the College. Trees that suffered from the disease in 1936 were used, leaving some trees untreated. Borax was applied in the spray, on the surface of the ground, and inserted to a depth of a foot or more in crowbar holes and dissolved in water by means of a specially constructed injector. One grower reported applying borax at the rate of 100 lbs. per acre. No injury to the trees has appeared in any case and no internal cork has shown up in either treated or untreated trees. Probably the abundant rainfall is the reason. When the next dry summer comes along we may expect to see the disease again. We await that season to learn more of the effectiveness of Borax.

J. K. Shaw

Storage Suggestions from New Hampshire

Tech. Bul. #67 from the New Hampshire Experiment Station gives much information about the storage of apples. Prompt storage of McIntosh at 32° is desirable if the longest possible storage life is the objective. At lower temperature brown core is apt to appear. Delayed storage may give higher quality at the expense of storage life. Baldwin shows less wastage when stored at 30°. Cortland should be picked when the ground color begins to take on a slight yellow tinge. If picked too early they show scald, if too late internal breakdown may appear. Maggot larvae are killed by one month storage at 30° to 32°. Many of the observations are in harmony with experience at this Station. The bulletin contains much information valuable to our growers.

J. K. Shaw

A New Idea in Fruit Storage

The gas storage of fruits is being slowly perfected. Davis and Blair, working in Ontario, have concluded that McIntosh developed brown core or "core-flush" more readily when stored at 32° than when kept at 36° or 40°. At the higher temperature, however, the storage life of the fruit was shortened unless the normal CO₂ content of the air was increased. McIntosh apples stored at 40° F. under a CO₂ concentration of 7.5% and wrapped in oiled paper repeatedly kept with the minimum of spoilage and with less shrinkage and loss of flavor and crispness than when kept at 32°. They report that McIntosh taken from their gas storage as late as March 15 were as good as McIntosh normally

are on December 1, and with the added advantage that they kept better after removal from storage. When placed in gas storage without oiled wraps, scald developed rapidly after two months. Problems still to be solved include the practical construction of gas-tight storage rooms and the easier control of gas concentrations. Wrong concentrations spoil the flavor of the apples.

R. A. Van Meter

Storing McIntosh Apples

According to a paper entitled "Cold Storage Problems with Apples" which appeared in the November, 1936 issue of Scientific Agriculture, McIntosh apples stored at 36° F. kept as well as those held at 32° F. and furthermore, developed less browning at the core. This article discusses the use of the iodine test as a measure of maturity and also mentions experiments in the use of gas storage. In these experiments it was found that McIntosh apples held at 40° F. under 7.5% CO₂ concentration, provided they were wrapped in oiled paper, were in better condition as regards flavor and crispness when removed from storage as late as March 15th than similar lots held under the usual conditions at 32° F.

O. C. Roberts

The Welfare Apple Program

The Federal Surplus Commodities Corporation with New England headquarters at Concord, Mass., is actively engaged in buying apples of U. S. Utility Grade for distribution through welfare channels. Previous to October 21 arrangements had been completed for buying approximately 12,000 bushels in Mass. Inspection and delivery had at that time been completed on 3,945 bushels of 13 different varieties, as follows: Baldwin, 1433; McIntosh, 1299; Wagener, 306; Stayman, 207; Snow, 200; Spy, 110; Rome, 100; Cortland, 83; Jonathan, 81; Delicious, 65; Winter Banana, 39; Hubbardston, 30; Stark, 25. It is interesting to note that more Baldwins than McIntosh have been offered to date even though this is considered an "off year" for Baldwins. Mr. Saxon D. Clark, who is in charge of the project, reports a total of about 75 Mass. growers taking part in this marketing program of whom 25 are in western Mass. Any grower having apples which he intends to market through this agency should get in touch with the Concord headquarters at once. This suggestion is made because it is not known just how long the office will be kept open.

Treated Bands Bring Results in Bolton Orchard

Seven hundred and fifty feet of bands treated with Beta Naphthol were used in the apple orchards of Bolton Fruit Farm this season to test their effectiveness as a supplementary aid in codling moth control. The bands were placed on the trees about June 15 and were examined October 21, after the crop was harvested. In late spring, in preparation for banding, the trunks and main branches of the trees in the test blocks were thoroughly scraped to remove loose bark. At that time many of the trees yielded 80 or more overwintering codling moth larvae. When the bands were examined, a total of 4078 larvae was collected from 248 trees of the following varieties, Greening, Spy, Winter Banana and McIntosh.

This is an average of 16.4 larvae per band. The greatest number taken from one band was 84. Less than a third of the trees failed to show any larvae in the bands and these were trees without a crop.

It is generally recognized that the benefits from treated bands are not realized in full until the season following their application. In these blocks, however, there was a material reduction in the number of stings in the harvested fruit. This indicates some reduction in the numbers of the potential second brood. The larvae destroyed by these bands represents a potential population in 1938 of more than 100,000 codling moth larvae figured on the basis of approximately 40 eggs per female. Conservatively estimated, the use of codling moth bands in an orchard with heavy infestation is equivalent to at least one extra spray and the cost is only a fraction of the spray application. It would seem, therefore, that any grower who finds codling moth injury in excess of 10% might well consider banding as a supplement to the spray program.

A. I. Bourne

Possible Control for Oriental Fruit Moth in Quinces

It is generally recognized that the quince is one of the most favored food plants for the Oriental Fruit Moth. In many cases where the peach crop has been severely damaged, the quince crop has been a total failure. The fact that the flesh of the quince does not break down allows a number of larvae to develop in one specimen. Parasites which have been effective against this pest on peaches have not given good results on quinces because twig growth on the quince is normally very short which offers little opportunity for the insect to develop, as contrasted to the long period during which they can work in the growing tips of the peach tree. On the quince, therefore, it centers its attention on the fruit for longer periods than on the peach and once in the fruit they are beyond the reach of the parasite. A schedule of sprays using an oil-nicotine combination beginning at the Calyx stage and applied at 2 week intervals for 6 or 7 applications has given up to 90% clean fruit as reported in experiments conducted in New York. (Bul. 669, Geneva Agr'l. Exp. Sta.). Other experiments along a similar line are reported in Ohio Bul. 569.

A. I. Bourne

Improving the Wild Blueberry

The 1937 Yearbook of Agriculture has recently been issued by the U. S. Department of Agriculture. The general topic considered in this yearbook is the improvement of plants and animals through breeding and selection. This book contains a large number of interesting and instructive articles. One that interested me especially is an article entitled "Improving the Wild Blueberry" by Dr. Frederick V. Coville. It was written only a few weeks before Dr. Coville's sudden death on January 9, 1937.

This article is a summary of his 30 years' work in improving the wild highbush blueberry. It tells of his selection and breeding work and gives much useful and interesting information concerning the value of varieties, their origin, description, and the origin of their names. Of particular interest are the notes on some of the first varieties which were named and used in Dr. Coville's breeding work but which were never introduced into commercial production; also notes on 2 quite new varieties, Weymouth and Dixie. Anyone interested in blueberries will find this article exceedingly interesting and instructive.

J. S. Bailey

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FRUIT NOTES - November, 1937

W. H. Thies
Extension Horticulturist

Organic Matter in Orchard Soils

The question as to whether or not an abundance of organic matter is really necessary in apple orchard soils has led to considerable research and more speculation on the part of fruit men in every apple region in the country. Experiments in Pennsylvania were interpreted as indicating a direct correlation between soil organic matter and tree performance. In California, citrus groves, and in Washington, apple orchard trees declined in vigor and productivity following long periods of clean cultivation that seriously reduced the organic content of the soil. But in New York, heavy manuring which increased the soil organic matter failed to increase yields over a period of ten years.

To continue the studies in New York, Cummings analyzed 96 surface soils and 31 subsoils in orchards of known performance. He found wide variations in organic content but no correlation with yield over a four-year period. He concluded that the amount of organic matter in a soil gave little or no indication of the performance of apple trees on that soil. He recognized, however, the fact that soil management methods that maintain organic matter are also the ones that maintain high yields, and suggested that it must be the turnover of organic materials in the soil that bring many of the benefits that have been attributed to a high organic content. (Cornell Bul. 672).
R. A. Van Meter

Rats Are Our Most Destructive Animals

Fruit growers who have been bothered with rats in storage plants may take consolation in the fact that these pests are not something new. They appeared in Europe about the 12th century, having originated in the Orient. The first ships to touch American shores brought along ancestors of the rats which now infest every state of the Union and which cause an annual loss of 189 million dollars in this country alone. Rats have lived with human beings so long that they probably know as much about us as we know about them. It is natural, therefore, that they are difficult to control. The use of Red Squill, an onion-like bulb of a Mediterranean plant, is the most common form of control. This substance has the advantage of being specific for rats and relatively harmless to other animals.

Individuals who have not had good results with the Squill are advised to prebait for the animals and use a different poison. This involves placement of several types of unpoisoned food such



as hamburg, bread crumbs, various vegetables and fruits along walls where rats are known to run. When it is noted that the animals are taking a certain type of food, the poison should be included with this food. Strychnine is not recommended as the rats can detect its bitter taste. A new phosphide rodenticide is usually very effective. No two rat problems are exactly alike, and individuals who have been unsuccessful in controlling this pest should contact W. W. Dykstra of the Biological Survey at the Worcester County Extension Service, P. O. Bldg., Worcester.

Progress on Mouse Control

Approximately 850,000 apple trees in Massachusetts were represented by orchardists who attended mouse control demonstrations during the past two and a half months, according to W. W. Dykstra of the U. S. Biological Survey. The work is being carried on in cooperation with the State Department of Agriculture and Extension Service. The new control method consists of placing in the mouse trails pieces of apple sprinkled with a new rodenticide.

Orchardists throughout the state reported severe mouse damage two years ago. Many individuals in the eastern part of the state also suffered from considerable damage last winter. Mr. Dykstra reports heaviest infestations in eastern counties. A number of orchardists have already observed some damage this season. Orchards should now be inspected for signs of fresh mouse trails which can be clearly seen a few days after light snow. Individuals who have not yet secured the mouse rodenticide should contact Mr. Dykstra in care of the Extension Service at Worcester.

Varieties of Fruits for Massachusetts (Arranged approximately in order of season).

Apples: *Early McIntosh, Duchess (Oldenburg), *Red Gravenstein, Wealthy, *McIntosh, *Richared, Cortland, *R.I. Greening, Wagener, Golden Delicious, *Baldwin, *Spy, Stayman.

Crab Apple: Hyslop.

Pears: *Clapp, *Bartlett, *Seckel, Gorham, *Bosc, Anjou, Dana's Hovey, Winter Nelis.

Peaches: *Mikado (self sterile), Marigold, *Oriole, *Golden Jubilee, *Pioneer (W), *Halehaven, Belle of Georgia (W), *Elberta, *J.H. Hale (self sterile).

Plums: Formosa (self sterile), Burbank (self sterile), Reine Claude, Imperial Gage, Grand Duke, Monarch, Shropshire Damson, Italian Prune.

Cherries: Sour - *Montmorency, English Morello, Duke - May Duke. Sweet - Seneca, Bing, *Windsor.

Quinces: Orange, Champion.

Grapes: *Fredonia, Ontario, Delaware, *Worden, *Brighton, *Niagara, Concord.

Strawberries: *Howard 17 (Premier), Howard Supreme, Dorsett, Fairfax, *Catskill, *Aberdeen, Commonwealth. Everbearer - Mastodon.

Raspberries: Black - Logan, Plum Farmer, Cumberland.
Red - Chief, *Newburgh, Taylor, *Latham,
St. Regis (everbearer). Purple - Sodus.

Blackberry: Eldorado.

Currants: Not allowed in many towns. Consult Department of
Agriculture, State House, Boston, Mass.

*Wilder, Viking (resistant to blister rust).

Blueberries: Cabot, *Pioneer, *Rubel.

* Most reliable for commercial planting.

New or Little Known Varieties for Trial (Arranged approximately
in order of season).

We have fruited most of these varieties in the College
orchards and they seem to be most promising among the new or
little known sorts. We suggest them for trial only.

Apples: Crimson Beauty, Lodi, Red Duchess (VanBuren),
Milton, Patricia, Blackmack, Macoun, Kendall, Red
Spy, Gallia Beauty, Lawfam.

Peaches: Buttercup, Sunbeam, Rosebud, Delicious, Raritan
Rose, Cumberland, Radiance, Golden Globe, Vedette,
Valiant, Veteran, Golden East, Eclipse, Primrose,
White Hale.

Pears: Cayuga, Conference, Phelps.

Plums: Wrights Early, Santa Rosa, Stanley, Imperial Epin-
euse, Hall, Albion, Pacific.

Cherries: Sweet - Early Rivers, Victor, Stark Gold (hardy),
Emperor Francis. Dukes - Reine Hortense, Late
Duke.

Strawberries: Wayzata (Everbearer), Lucky Strike (everbear-
er), Clermont, Gem (everbearer), Thompson Late.

Raspberries: Marcy.

Grapes: Erie, Keuka, Portland, Seneca.

Blueberries: Rancocas, Concord, Stanley, Jersey, Wareham.

Pomology Students View Marketing Methods

On November 11 and 12 the writer, accompanied by a
group of students enrolled in the marketing courses given by the
Pomology Department, spent a profitable two days visiting points
of interest connected with the handling of fruit. The first day
was spent in a study of the methods employed in preparing fruit
for market and the second in observing the methods used in sell-
ing it. On the way to Boston we stopped at the Nashoba Apple
Packing Association in Ayer, the Vinegar Works in Littleton,
Arthur Calkin's packing house at Harvard, David Clemens' storage
house at Stow, C. D. Fletcher's storage plant at West Concord,
and the Regional Produce Market at West Cambridge.

The second day was spent touring the selling agencies
in the Boston Market District under the able leadership of Mr.
Harry Campbell of the State Department of Agriculture. Several
commission houses were visited in addition to stops at the Boston
Terminal Market, the Auction Market in Charlestown, and the
Quincy Market Cold Storage. Unless one were actually present

on the trip he could not properly appreciate the spirit of co-operation and helpfulness that prevailed at every stop. Everybody with whom we came in contact seemed eager to describe the operation and function of their particular organization in the distribution of fruit. As a result, the boys returned to Amherst loaded with information about marketing which was real and practical. I am confident that many fruit growers would profit from a similar trip.

O. C. Roberts

Stray Thoughts

The late Joseph Pulitzer, blind editor and owner of the New York World, roamed all over the world and had every luxury at his command, but no matter where he went, he saw to it that apples were a part of his daily diet. They were the only dessert he would touch. Pulitzer said he learned to like apples when he was a half-starved immigrant in St. Louis.

In the November issue of Better Fruit, there appears an interesting article by Celmer and Cruess on "Some Experiments in the Canning of Apple Juice." The authors estimate the amount canned in 1936 at 100,000,000 gallons. The details concerning canned juice of 5 varieties, Gravenstein, Stayman, Jonathan, Winesap, and Northern Spy, are given.

Nineteen varieties of peaches which are still propagated to some extent are recommended for discard by a majority of the Northeastern States.

A fruit tree census of the State of Washington, just completed, reveals about 4,100,000 apple trees of all ages, 1,500,000 pear trees and more than 1,000,000 prune and plum trees. Peach, cherry, apricot and nut trees total nearly 2,000,000 trees. The report shows the planting in 1935 of more peach trees than of any other kind of fruit. More than a third of the pear trees are less than 10 years old compared with about one fifth of the apple trees in that age group. Previous to 1936, the Winesap variety of apple was the leader in number of trees. The Delicious and its red sports now takes the lead.

British Columbia apple growers will have the benefit of an extensive advertising campaign in Manitoba this year, with the decision of the British Columbia Tree Fruit Board to spend \$10,000 to stimulate sales in that market.

A new method of handling Golden Delicious is being tried by the Beebe Orchards in Wenatchee this year. Cardboard boxes somewhat larger than the wooden boxes formerly used take up the bulge normally found in both top and bottom, thus avoiding many packing bruises.

That the testing of orchard soils for acidity may be important, is indicated by the "tying up" of phosphates in an acid soil.

According to Blake of New Jersey, permanent apple trees set 40 x 40 feet apart with a filler tree in the center of each square, appears to be a sound modern practice. This permits approximately 27 permanent trees and 27 fillers per acre. With this system, the fillers may often be retained for 15 or 20 years. Adequate spacing is fundamentally important for satisfactory soil management, tree development, growth status and efficient spraying.

Young apple trees ought to be grown in cultivated land and not in sod. Yet some growers start trees in sod with some success provided the mice do not get at the bark. Of course the prescription for the mice is modern poisoning, but it is wise to allow no grass roots within a foot and a half of the young tree. Hoe, hoe, hoe, if you would grow young trees in sod. A few of our clonal stock trees were girdled, evidently about August.

(J.K. Shaw)

"Practically speaking" says J. R. Magness, Department pomologist and author of the apple section in the 1937 Yearbook, "the apple breeder works for his descendants, not for his own generation." "The hope of obtaining better apples," he declares, "lies in extensive breeding programs of the present and the future. The objectives are increased winter hardiness, especially in the North; resistance to the major diseases of scab, blotch, bitter rot, fire blight, and apple cedar rust; resistance to spray injury, late blooming to escape spring frosts in some sections; a combination of rich flavored fruit and desirable tree characters; a greater range of fruits with color, quality, and ability to keep well in storage; and varieties adapted to the far South, where at present there are none satisfactory."

In the December issue of Fruit Notes there will appear a summary of the activities of the Federal Surplus Commodities Corporation during the past few weeks. This agency, under the supervision of Saxon D. Clark with headquarters at Concord, Mass., has done a very effective piece of work in purchasing New England apples of U. S. Utility Grade for welfare purposes.

Studies by Ellerwood and Gourley of apple tree root distribution and penetration in Ohio show no tendency toward shallow rooting in mulched orchards. They suggest the advisability of widespread applications of fertilizer because of a tendency of roots to spread rapidly over the whole orchard area. In August of the very dry year, 1930, moisture was found to be much higher beneath a mulch than outside. Size of fruit was also larger on the mulched area.

A recent publication from the N. J. Dept. of Agriculture contains some interesting information about average yields of apples in the different states. Yields vary in 1934 from .7 bu. per tree in Indiana and Illinois to 6.9 bu. per tree in Washington. New England shows an average of .9 bu. per tree. Granting that 1934 was an off year in some sections, the average yield will vary tremendously not only in different states but in different orchards in the same state. A good yield of fruit year in and

year out is the keystone to success in a successful orchard enterprise. Without it, profits will be few and far between, even with a good manager on the job.

After a 5-year study and extensive tests to observe results, the Manufacturing Chemists' Association has agreed upon a change of color in white arsenates to provide a satisfactory safeguard to prevent their being mistaken for other household materials. Lead arsenate now being produced for the 1938 crop season is colored pink while the color of calcium arsenate will also be changed from white to pink when present stocks of the insecticide are exhausted.

A word about the importance of mulching the strawberry planting is in order at this season. No expenditure of time or money on the planting next spring will net the same returns as an expenditure in "putting the plants to bed for the winter." Mulching is unquestionably a means of increasing the yield of salable berries. It should become as much a matter of habit as fertilizing or cultivating. If other suitable mulch material is not available, we would recommend the purchase of baled straw.

Clark of New Jersey states that 3 tons of salt hay per acre is ample for mulching a strawberry planting. This will provide an all-over coverage, while 2 tons will provide a fair coverage if well spread.

The original Concord grapevine is reported to have borne its 87th crop this season. The first fruit of this variety was obtained by the originator, E. W. Bull, in 1849. Within a few years, 26,000 acres had been planted and its fame had spread half way across the continent. In 1865 it was awarded the Horace Greeley prize as the best grape for cultivation. It is still considered an excellent grape, but a little too late to develop best quality in some seasons in Massachusetts.

Cardinell, of Michigan, suggests that raspberry prunings be utilized by running them through an ensilage cutter and returning them to the soil as a source of organic matter. He reports no evidence that the presence of disease was in any way augmented by the application of prunings, insofar as his experiments are concerned.

Imagine, if you can, a farmer driving 25 miles in a heavy rain to replace 5 bushels of potatoes purchased at his farm, concerning which a mistake had been made. That was the experience of the writer a few days ago, and the honest farmer is a large producer of both potatoes and apples. "I'm afraid the potatoes you got were 'Seconds' instead of 'Firsts,' and I want to make it right." No matter what we may say about the business ethics of an occasional fruitgrower or nurseryman, it is gratifying to know that Diogenes can now hang up his lantern, confident that he has at last found a man of unimpeachable integrity. The writer will not hesitate to recommend this thoroughly honest grower as a source of good potatoes and good apples.

MASSACHUSETTS STATE COLLEGE
UNITED STATES DEPARTMENT OF AGRICULTURE
AND COUNTY EXTENSION SERVICES IN AGRICULTURE AND
HOME ECONOMICS COOPERATING

FRUIT NOTES - December, 1937

W. H. Thies
Extension Horticulturist

A Pointer on Pruning Bearing Apple Trees

The removal of "Thin wood" from bearing apple trees has long been recommended. A brief explanation regarding the development of such wood may be in order. Sooner or later every fruit spur on an apple tree tends to outlive its usefulness. As successive apples are borne on the spur, the branch to which that spur is attached assumes a lower position. It bends downward while secondary shoots grow upward and outward from the upper side of the branch. A horizontal branch of today may have been a vertical branch ten years ago. And as we observe a tree of bearing age it is interesting to visualize the history of its growth. The earliest bearing branches are found to be submerged and shaded by the more recent growths above. It is in such a tree that we begin to find some of this so-called "Thin wood." Into this category are placed those horizontal or drooping growths which develop in partial shade. It is the sort of wood on which small, green apples of poorer quality are produced. It is therefore the sort of wood upon which we should concentrate our attention as we embark upon the pruning expedition.

The removal of "Thin wood" is literally a dormant season thinning of the fruit, since it involves the elimination of inferior fruit at its source. Obviously, more of this handicapped wood will be found as the tree becomes older. We must therefore exercise judgment in deciding how soon a branch or portion of a branch should be removed. In general, few growths above a horizontal position are ready for removal. And as we look the tree over, we should first decide which branches are best equipped to produce good fruit. We may then proceed to cut out those which are a detriment to the better producing branches. It should be pointed out that this method of pruning does not involve a wholesale removal of low limbs. Instead, it means making a considerable number of cuts throughout the top and particularly on the inside of the tree, paying attention to the shaded, downward growing parts of each branch. The writer believes that the "Thin wood" idea in pruning is excellent. But he would go a little farther and do a small amount of thinning in the outer shell of the tree. This is in addition to removing the hopelessly shaded growths which have not been exposed to direct sunlight for years.

Summary of Apple Handling Survey

Following are the results of a recently conducted survey among apple growers of New England, designed to find out how apples are being handled in the Northeast.

Number of questionnaires sent out, 100. Returned to date (Dec. 30), 68. Most of these are in Massachusetts but other New England states are represented.

Acreage covered by reports: 10 years or older, 4,331, (Size of plantings varied from 3 acres to 300 acres). Less than 10 years, 1,225, (Size of plantings varied from 2 acres to 100 acres).

Total crop reported for 1937: 918,975 bushels, divided as follows: McIntosh, 59%; Baldwin, 13%; Delicious, 3%; all others, 25%. Size of crop varied from 700 to 61,300 bu.

Method of picking: Mass. picked, 56%; Spot picked, 4.4%; (35% of those reporting use both methods).

Picking utensils: Pail, 33%; Basket, 40%; Bag, 27%. Day labor used by 52%; piecework, 48%.

73% store orchard run; 14% pack for sale and store; 10% remove culls and store; 3% remove culls, size and store.

69% store on farm; 22% store in country point custom storage; 7% store in city storage.

69% of crop goes to market in crate; 13% in Eastern Standard Box; 7% in Western Box; 7% in carton; 4% in basket.

40% of growers haul 2 miles or less to storage; 68% haul less than 5 miles; 83% haul less than 10 miles.

Plantings in 1935-36-37 totaled 310 acres. Plans to plant in 1938-39-40 total 210 acres.

60% of those reporting are testing one or more of a total listing of 22 new varieties, including Cortland, which may not be "new." 8,000 of these "new variety" trees were reported. W.R.Cole.

Many Cooperators in Welfare Apple Deal

Saxon D. Clark, Marketing Specialist in charge of the apple purchase program which terminated Nov. 30, reports a total of 70 vendors, mostly producers participating in the marketing of apples for welfare purposes. During the seven weeks that the office was maintained in Concord, 32,855 bushels of apples were purchased and distributed. It is interesting to note that approximately seven times as many Baldwins as McIntosh found their way into welfare channels. The variety classification was as follows:

Baldwin	21,021 bu.
McIntosh	2,969 "
Wagener	2,519 "
Misc. Varieties	6,346 "
Total	32,855 "

The above project involved apples of U. S. Utility Grade, only. It is one of the many activities of the Federal Surplus Commodities Corporation designed to remove surplus fruits and vegetables from the market and insure their distribution to needy families.

Fruit Industry Problems as Seen by the Grower

In Worcester County the Fruit Industry Committee is made up of the following growers: A. N. Calkins, Harvard; John Chandler, Sterling; C. R. Clemens, Bolton; Jonathan Davis, Sterling;

R. J. Fiske, Lunenburg; H. P. Gilmore, Westboro; T. B. Morse, Paxton; and H. A. Taylor, Millbury. This committee met on Dec. 7 with County Agent F. E. Cole and the writer to discuss county fruit problems and what should be done about them. Mr. Chandler acted as chairman. Here is the list of nine problems with sub-divisions as recorded at this meeting and submitted to each member of the committee by Mr. Cole for further consideration.

Production Problems:

1. Standard of quality
 - a. How fancy an apple can we afford to grow?
 - b. How can we get more color on the McIntosh?
2. Soils
 - a. What is a desirable soil for planting an orchard?
 - b. What can be done to improve faulty soil conditions that are found under existing orchards?
3. Annual bearing
 - a. How can McIntosh trees be kept in annual bearing?
4. Pest control
 - a. What is a timely application of scab sprays?
 - b. How can leaf hopper be controlled?
 - c. How can spray injury and russetting be reduced?
 - d. How can losses due to neglected trees on adjacent property be reduced?
5. Varieties
 - a. How can a wise selection of apple varieties be made for the future security of the industry?

Marketing Problems:

1. Harvesting
 - a. How can we harvest our McIntosh to get the most color and quality?
2. Handling
 - a. How can apples be transferred from the tree to the consumer in the best possible condition?
3. Selling
 - a. How should apples be sized and graded to facilitate their movement through retail outlets?
 - b. How can we improve the labeling and display of apples in retail outlets?
 - c. How can we secure reasonable distribution of our apples within "McIntosh Territory?"
4. Culls
 - a. What can be done to reduce the interference of the cull apple in our markets?

The above problems are not peculiar to Worcester County alone. They are basic problems of the industry and therefore deserve the combined attention of Experiment Station, Extension Service, and of the growers themselves.

Pointed Paragraphs

Measurements of Rhode Island Greening apples, reported by E. P. Christopher of Rhode Island, show an increase in volume of about 25% from September 1 to October 1. This seems to offer a strong argument against early picking.

During the past five years there has been a much wider variation in apple yields in the East than in the Northwest. In the Northwest, the annual yield of apples varies from approximately 50 to 55 million bushels, a variation of about 10%. In the East, the variation has amounted to as much as 100%. Control of the moisture supply through irrigation is an important factor in stabilizing fruit production.

It is interesting to note that the 1937 Massachusetts apple crop, 3,465,000 bushels, places this state 12th among the states of the Union in apple production. Washington leads the list with 30,340,000 bushels, followed by New York with 24,700,000. The other leading apple states rank in the following order: Virginia, Pennsylvania, Michigan, California, West Virginia, Illinois, Idaho, Missouri, Oregon and Massachusetts.

The Northern Spy is one of the richest apple varieties in its content of Vitamin C. It is from 5 to 6 times as great as in McIntosh. The Delicious variety is one of the poorest of all in Vitamin C content.

The 90% Clean Apple Club is still going strong in New Hampshire under the supervision of C. O. Rawlings, extension horticulturist. In 1937, 31 growers qualified on one or more varieties. McIntosh led the list with crops totaling more than 120,000 bushels. Baldwin was next with about 45,000 bushels, followed by Wealthy with 5,400 bushels.

According to J. R. Magness of the U.S.D.A., no commercial apple producing area has ever made a reputation for its product from old orchards. He estimates that not more than 4% of the national commercial apple crop is produced in orchards more than 40 years of age. To stabilize commercial production and to maintain orchards in a more profitable age group, it is essential that new plantings be made each year and old plantings discarded.

An interesting fruit contest is under way in Minnesota, to the end that more and better fruit may be grown in that region. Hundreds of rural and urban residents are expected to enroll. The first prize consists in a free trip, with maintenance, to and from the next Farm and Home Week Short Course at University Farm. In this contest, sponsored by the Duluth Chamber of Commerce, and designed to stimulate more interest in the development of home fruit plantings, the varieties grown must conform to the recommendations of the Experiment Station. Spacing of fruit units, summer care, and provision for cross pollination are some of the requirements. The general fall condition of the planting, survivals, and a written story of what has been done, are other factors to be considered in determining the winners.

Two plant explorers, H. L. Westover and F. L. Wellman, of the U.S.D.A., recently spent 8 months in Asiatic Turkey where a civilization existed 6,000 years ago. They brought back 500 samples of farm crops, vegetables, fruits and ornamental plants which will be tested for possible value in this country. If, out of this mass of new material, one plant of Montmorency cherry or McIntosh apple caliber should develop, the effort will have been very much worthwhile.

In a study of 20-year-old apple trees in the Ozark region of Missouri and Arkansas, A. T. Sweet of the U.S.D.A., found such trees utilizing the moisture and plant food of at least 5,000 cubic feet of soil where the subsoil was porous and open. Where the subsoil is tight, he states, apple trees do not grow well, produce abundantly, or live as long.

Many growers have asked about the possibilities of preventing "bitter pit" in Baldwin and Northern Spy by the use of boron. Following is a statement made by M. B. Davis, Dominion Horticulturist, of Ottawa, Canada. "In the case of bitter pit, none of us are as yet in a position to state definitely that it can be cured by boron applications, but we have been able to cure it by reducing the nitrogen. It is a trouble which is apparently induced on varieties like Northern Spy by high nitrogen applications, and in several instances we have been able to prevent it by withholding the nitrogen and building up the mineral content of the soil." If bitter pit, as commonly supposed, is due to fluctuations in the moisture supply, it is easy to see how the excessive use of nitrogen may increase the demand for water by a heavy increase in leaf area. Thus we find heavily stimulated Baldwins and Spies on droughty soils very subject to bitter pit.

Quoting from a recent article by F. A. Beach of Ohio published in Nursery Notes, "On sites and soils where the experience of recent years has revealed serious damage to apples from winter injury, it is urged that attention be given to the opportunities of developing better, longer lived trees by top working on hardy understocks such as Hibernial, Virginia Crab and Tolman. Virginia Crab has a splendid record as an understock for Grimes. Where hardy understocks are used, it is advised that the variety be budded or grafted out on the scaffold limbs at least 18 inches from the trunk after the young tree is well established in the orchard, in order to get full advantage of hardy crotches and trunk. Varieties which have shown extreme susceptibility to winter injury are Baldwin, Wagener, Delicious, King, Winter Banana, York, Jonathan, Golden Delicious and Grimes." Under Massachusetts conditions there is reason to believe that the McIntosh will provide a good stock on which to graft in case a grower sees fit to change part of his McIntosh planting to another variety.

Color in an apple is important to both grower and consumer. For the grower, there is the practical advantage that well colored apples are not nearly so subject to injury by storage scald as are apples in which color is perfectly developed. For

the consumer, color is a practical and easy guide in the selection of good ripe fruit. The chemical changes that are essential to the formation of good color are the changes that are also required to bring fruit to maturity and to develop flavor, aroma and palatability.

According to Pennsylvania authorities, the cover crop is a reliable indicator of what the orchard will be 10 years hence. Ten years after the cover crop fails, the orchard will fail.

A man in Orleans, Indiana is reported to have an apple tree that has been so grafted and budded that it now bears 71 different varieties of apples, 5 kinds of pears and 3 kinds of crabapples. As an example of concentrated backyard horticulture, the owner of this tree, A. R. Troth, seems apparently to have established some kind of a record.

"Did you ever eat a perfectly ripened Bosc pear?" inquires an editorial in Better Fruit. "When it has reached that delectable stage it looks like an enlarged drop of russeted gold, and is a flagon of nectar and a packet of ambrosia all in one. A few years back there were a lot of Bosc pears raised in the Northwest. But they had to be picked hard green, shipped, put into cold storage, taken out and put onto the fruit stand in the same condition. There they were sold to customers who tried to eat them and were promptly disgusted and vowed never to buy another, or they gradually shriveled up and were still worse." There is a lesson here for New England growers of McIntosh apples. No wonder people buy oranges if their first sample of McIntosh is a green, rubbery, immature specimen, to say nothing of being bruised and shopworn.

The State Horticultural Society News of New Jersey offers this advice, "Competition in modern fruit growing is too keen, and will continue to be so, to make it profitable to produce fruit upon unfavorable sites. Apples will not be a success on land which is so wet that plants such as sedges, bullrush, alders or willows tend to grow naturally. Even if there is good surface drainage of water, the results will be unsatisfactory. The air above a wet soil is more humid than above a well drained soil. This often means the difference between difficult control of diseases and comparatively easy control. Eliminate the seriously handicapped orchard."

When dry weather stops fruit growth several days during the summer it is impossible to make up for lost time. The fruit will be smaller than normal no matter how favorable the conditions after that. Irrigation is the only reliable insurance against losses from drought.

The total amount of rain falling on the earth's surface day and night is reported to be 16,000,000 tons per second. Yet the earth is not flooded because evaporation tends to keep its surface in balance.

A new publication by Blake, Nightingale and Davidson of the New Jersey Agricultural Experiment Station (Bul. 626), "Nutrition of Apple Trees," has recently been published. Leaf symptoms of mineral deficiencies are shown in natural color. The authors point out that deficiencies of plant nutrients are most likely to occur on light sandy or sandy gravelly soils. Even where apple trees are planted at optimum commercial distances, the roots will ultimately utilize the entire soil area if they receive proper culture. Fertilizer and cultural practices, therefore, should be designed to develop or maintain the fertility of the entire orchard area.

In addition to the three elements usually considered necessary for the growth of a plant, at least eight others have thus far been found essential, as follows: calcium, magnesium, iron, boron, sulphur, copper, manganese and zinc. Only minute quantities of the latter minerals are required for most plants and the average fertile soil is likely to be sufficiently well supplied.

An interesting bit of arithmetic is found in bulletin 363 of the Missouri Agricultural Experiment Station, "Fertilizing Fruit Trees with Nitrogen." In one table we find the following figures which itemize the nitrogen needs of a 20-year-old apple tree. The figures are expressed in pounds of fertilizer containing 20 to 21% nitrogen. Nitrogen removed with fruit crop, 2 lbs.; nitrogen removed by pruning, .5 lbs.; nitrogen lost from autumnal dropping of leaves, 2 lbs.; nitrogen lost from dropping of flowers and young fruits, .3 lbs.; nitrogen required for maintenance (growth), 1 lb.; total 5.8 lbs. Nitrogen returned to tree from decay of flowers, fruit, leaves, etc., 1.2 lbs. Difference (net requirements to be applied), 4.6 lbs.

C. L. Burkholder of the Indiana Experiment Station says, "To maintain a desirable straw mulch on mature trees, requires at least 2 bales per tree to start with and a bale per tree thereafter." He says that wheat straw contains 10 lbs. of nitrogen, oat straw, 12 lbs., and rye straw 9.3 lbs. per ton. In addition to this, there is a small amount of phosphorus and considerable potash. The fertilizer value of straw is therefore from \$1.67 to \$2.74 per ton, based on fertilizer prices. Straw must therefore be considered as a source of some fertility in addition to its virtues as a mulch in the stabilizing of moisture relationships. Incidentally, the fertility bound up in such organic matter is not made available unless a supply of nitrates is available to bring about its decomposition.

Missouri Bulletin 379, "Pollination and Fruit Setting," points out four early season waves or periods of dropping, in apples. While information as to causes of these "drops" is incomplete, the first drop is known to be that of flowers which lack pollination or are self pollinated. The second drop of small fruits is evidently due to embryo weakness and poor growth, due to faulty nutrition. The third and fourth drops are composed of fruits 1/2 to 1 inch in diameter which fall because of a poor food

supply and a resulting competition between the various fruits. Individual limbs and branches will differ in the amount of drop at this time. Judicious use of nitrogenous fertilizers and provision for pollination by bees are recommended as a help in the control of early fruit drop.

According to H. B. Sprague of the New Jersey Experiment Station, the structure of the soil is highly significant from the standpoint of drainage, aeration, and water holding capacity. Continuous cultivation exhausts the humus supply and causes a breakdown in granular structure of the soil. Grass will gradually restore soil structure to the depth of root penetration provided proper treatment is given. A balanced fertilizer, plus lime, produces a sod that is durable, drought resistant and capable of sturdy growth in both cool and warm weather. Organic matter additions are effective in changing soil structure only when incorporated in the soil itself. But when incorporated, it is extremely effective in improving soil structure.

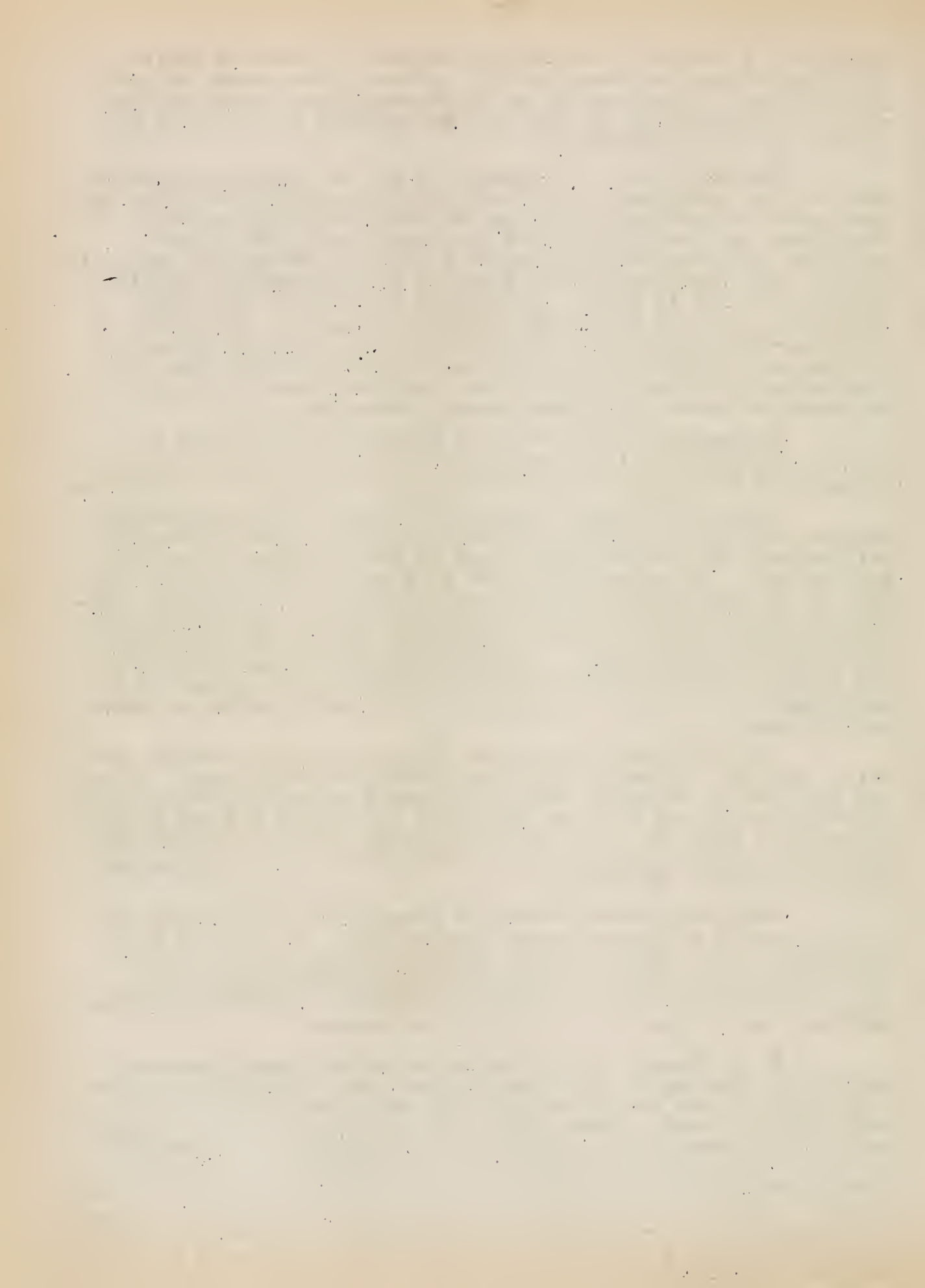
A monument stands today at Newport, Rhode Island in memory of Michele Felice Corne, who first dared to eat a tomato in spite of the age old superstition that tomatoes were poisonous.

That the internal structure of apple leaves has an important relation to photosynthetic activity is shown in Technical Bulletin 42, recently published by Kansas State College of Agriculture. The experimenter, W. S. Pickett, believes that the rate of photosynthesis is influenced not only by chlorophyll content of the leaves, nitrate and moisture supply, temperature and carbon dioxide content of the atmosphere, but by the intercellular space within the leaf. He points out that this characteristic exerts its influence partly by determining the extent of the moist surface of cell walls which have a direct bearing on starch manufacture.

The California Cultivator tells of an X-ray machine now being used in California to detect frosted or dry oranges, lemons and grapefruit. Damaged fruit is detected through a leaded glass window as it passes over the X-ray and is sent on its way to the by-products plant by the touch of a lever. Maybe in the future we'll have such a machine in the Northeast to reveal hidden defects in apples. Who knows?

"Replacing Power Plants of Spray Rigs" is the title of an Engineering Extension Series Leaflet (#61), written by W. C. Harrington of the State College staff. Any grower who contemplates the rejuvenation of a sprayer through the installation of an automobile motor, will find some helpful hints in the above publication. A copy may be obtained on request.

W. A. Sherman of the Bureau of Agricultural Economics says, "Apple growing is now a specialized job. Originally, apples were picked by the family or farm help and stored on the place until sold in nearby towns. Today the commercial orchard demands such special machinery, buildings, and distribution of labor that the orchardist usually, is not a general farmer. He is primarily a fruit grower and any other use of his land is incidental. Thousands of farmers with land adapted to fruit growing find it cheaper to buy most of their fruit from professional orchardists than to equip themselves to take proper care of the few trees needed for home supplies."



MASSACHUSETTS STATE COLLEGE
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FRUIT NOTES - January, 1938

W. H. Thies
Extension Horticulturist

Need of Potash and Phosphorus in the Orchard

Most fruit growers are familiar with the pioneer work of the Geneva Experiment Station from which they concluded that fertilizing a cultivated orchard was a waste of money. In more recent years they have found that in some experiments the trees have responded to nitrogen. Now comes a bulletin discussing potash and phosphorus in relation to organic matter. (Bul. No. 679, Potash and Phosphorus in Relation to Organic Matter in New York Orchards, by R. C. Collison). The author concludes that a deficiency of these elements will be greatly delayed in orchards (1) on the better fruit soils, (2) where farm manure or hauled in mulch is used liberally, (3) where good cover crops can still be grown, and (4) where a good grass sod can be maintained. Potash and phosphorus may be needed on (1) light soils naturally low in these elements, (2) where drainage is poor, (3) on soils subject to sheet erosion, (4) on excessively cultivated soils with consequently low organic matter, and (5) where there is excessive use of nitrogen. Where there is a possibility of a lack of potash and phosphorus, the author suggests that they be tried on a part of the orchard and the results observed, before using them generally.

These conclusions agree very well with our experiences at Amherst. While nitrogen is most often deficient and it does not yet appear that all of our orchards need the other two elements, there may be cases where their use in addition to nitrogen will be profitable. This question must be answered for each individual orchard.

J. K. Shaw.

Recent Cold Weather and the 1938 Peach Crop

In spite of very low temperatures during the morning of January 19 the prospect for a peach crop in the College orchard is still good. The official thermometer back of Stockbridge Hall registered -12° F. A minimum thermometer in the peach orchard registered -17° F. Another minimum thermometer placed in a hollow about 200 yards from the peach orchard registered -24°. This emphasizes again the great difference in minimum temperatures which may occur within a small area and the necessity for locating peach orchards so as to avoid cold spots. Although the temperature in the peach orchard reached 17 below zero, the amount of bud killing on seven varieties, selected to give a range from the tenderest to the hardiest, was only 4 to 11 per cent. This is no greater than would be expected during a mild winter.

J. S. Bailey.

Notes From the Western Maine Fruit Growers' Convention, Lewiston, Maine - January 19-20, 1938.

Twenty-two Maine fruit growers applied for inspections in the 90% Clean Apple Club in 1937 and everyone qualified on at least one variety. The highest grade was 98.6% Clean fruit. Three growers qualified after applying only three sprays, and one of them applied only two sprays on a part of his orchard. In order to apply his pre-blossom sprays, one grower was compelled to lay planks between each second row of trees in order to get his spray rig through the orchard.

One of the more important minor insect pests in some Maine orchards is the Apple Seed Chalcis. In the apple inspections this little known insect was found to have damaged 28% of the fruit in one block. Since it is the habit of this insect to lay its eggs in the apple seeds, it usually is found only in small apples such as Lady apples and crabapples. In Maine, however, it has been particularly troublesome in Belleflower and has been found in other varieties.

Since the severe injury to Baldwin trees during the cold winter of 1933-34, Maine orchardists have been concerned about the future of the Baldwin and are still wondering what varieties should be planted as a substitute. At this meeting, Cortland and Spy were the leading candidates, and the Cortland was the favorite by a wide margin especially if the fruit was placed in cold storage. Although it was stated that many commission buyers were cold toward this variety, there were several favorable reports regarding the salability of Cortland in markets where it is known.

Specimens of moose damage to apple trees were shown. Branches up to 1/2 inch in diameter were bitten off cleanly, and it was reported that many larger branches were yanked off or broken so that small trees were ruined or severely injured.

Attempts to remove the necessity for thinning Wealthy apples by severe limb pruning have resulted in a greatly reduced vitality to the trees, and many of them finally died.

Liquid or dry lime sulfur are the approved fungicides for apple scab in Maine and their use is supported by grower's experiences as well as experimental results. Wettable sulfurs have not been accepted but there are a few exponents of dusting. The use of fresh high-calcium lime to reduce spray injury by lead arsenate-lime sulfur mixtures seemed to be a new thought. It was apparent that weather conditions favored the use of lime sulfur without foliage injury, and that fewer applications of a fungicide would give better control of scab than we could expect in Massachusetts.

W. D. Whitcomb.

Notes on Fruit Insects from the Geneva Station

In the Annual Report of the Geneva Station for the year ending January 30, 1937 are summarized some of the results of field experiments against fruit pests.

In the Hudson Valley orchards, codling moth was the outstanding apple pest. Tests were run in two orchards: one in which there was only a moderate infestation; the second, a very heavy infestation. Lead arsenate, three calcium arsenates, basic zinc arsenate, and phenothiazine were tested in each. In the first



orchard where infestation was light, all the materials gave good commercial control. In the face of the heavy attack, however, lead arsenate was the most effective material, and phenothiazine least. Furthermore, the calcium arsenates all caused more or less foliage injury. The tests indicated that none of the substitutes as yet equal lead arsenate for codling moth control.

Studies of insecticides in apple maggot control included tests with phenothiazine, powdered cube root, and hydrated lime. Hydrated lime gave little or no control. The results with cube and phenothiazine were promising, indicating that further work with these materials may lead to an effective poison and replace lead arsenate in late season applications.

Complete mortality of apple maggots in fruit was secured from storage at 32° F. for a 30-day period. Storage at 36° F. killed all maggots in 45 days. A few larvae survived exposure to 40° F. for 70 days.

A survey of Oriental peach moth infestation in four counties in western New York showed an average parasitism of 23.96% of 1st brood and 52.91% of 2nd brood larvae in the two counties where Macrocentrus parasites had been present for from 6 to 8 years. Parasitism was found to be 4.47% and 7.43% respectively for the two broods in the two counties where parasites had been present only four years.

In the counties where parasitism was high, fruit moth infestation was 5.38% while in the other counties the infestation averaged 24.40%. These figures indicate a correlation between the degree of parasitism and the amount of damage, and point out the desirability of establishment of Macrocentrus parasites in peach-growing sections where fruit moth is a serious pest. A. I. Bourne.

Something New in Orchard Soils

Through the cooperation of A. B. Beaumont and R. W. Donaldson, each soil type in Massachusetts is given a definite numerical rating which indicates its adaptability for the growing of tree fruits. This method of scoring takes into account the parent rock from which the soil originated, the fertility, texture, drainage, water holding capacity, nature of the subsoil, and stoniness. Thus far more than 60 individual soil types have been given a rating by these soils men, and plans are made for classifying the remaining soils of the state in the near future. This work was begun in Essex County some time ago when a study was made of the principal soil types of the county on which orchards had been planted. As the study proceeds, it is interesting to note the correlation between the rating of the soil and the productiveness of the orchard. Invariably, the high producing orchard is found to be growing on a soil with high rating. Massachusetts growers are apparently becoming soil conscious. Many of them are beginning to call soils by their modern names, such as Gloucester fine sandy loam and Merrimac loamy sand. The former soil type is given a rating of 85 for orchard purposes and the latter, 50. The planting of fruit trees on a soil which rates less than 50 may well be considered as a mistake, and such trees are under a distinct handicap. With even the most intelligent management, they are unlikely

to come into profitable bearing. The highest rating assigned to a Massachusetts soil thus far is 95. The lowest is 10.

Scoring the Fundamental Features of an Orchard

The complexity of an orchard is a matter of common knowledge to anyone engaged in the growing of fruit. And if we wish to evaluate a particular block of trees it is only natural that we think in terms of potential yields, since yields are closely related to future profits. But yields are influenced by many different factors, including soil, drainage, site, vigor, age of trees, etc.

In an attempt to provide a reasonably simple yardstick for measuring the above factors, an orchard score card has recently been prepared, and several Massachusetts orchards have already been scored. This score card is based on three fundamental items, soil, site and tree. Forty points each are assigned to soil and tree, and 20 points to site, making a total of 100 points. The actual score of an orchard is obtained by making suitable deductions for the observable shortcomings. For example, if the Soil Type, indicated by the Soils Map of the county, has a rating of 90 (discussed in paragraph above), the deduction for that item will be about 2 points and proportionately more for lower ratings. And if the terminal growth of the tree averages only half what it should be for that age, a deduction of about 3 points is made for Growth. Similarly, if part of the trees show the effects of a severe winter or are girdled by mice, they are scored down accordingly, under Injuries. As regards Layout, the scorer makes a deduction ranging from 0 to 50 points depending upon compactness of the block, its variety arrangement, nearness of water supply, etc. In the writer's opinion, the value of such an analysis lies more in the identification of shortcomings than in the actual score. The various deductions tend to focus attention on the specific things which prevent the orchard from being at its best. They suggest to the grower the question, What can I do about it? Incidentally, it will be noted that certain items like soil type, slope, age of trees, etc., are not subject to improvement, while most of the others can be materially changed and the score thereby increased. And if we adopt the standard of the school, a "passing grade" for the orchard will be in the vicinity of 70.

Orchard Score Card

	Deductions
Soil (40 points)	(Type ----- (Drainage ----- (Cover -----
Site (20 points)	(Elevation ----- (Slope ----- (Roughness -----
Tree (40 points)	(Growth ----- (Framework ----- (Age ----- (Spacing ----- (Injuries -----
Layout -----	_____ 100
Total Deductions -----	_____
Score -----	_____

An Apple Marketing Research Project

The Department of Agricultural Economics at Massachusetts State College is conducting a research project regarding certain apple marketing practices which we hope will reveal information that can be used in extension teaching next year.

A questionnaire was prepared by members of the Department of Agricultural Economics in conference with members of the Horticultural Division of the Massachusetts State College, a representative from the Massachusetts State Department of Agriculture, and a representative of the New York and New England Apple Institute. The questionnaire is now being filled out by county agents, members of the Department of Agriculture, and members of the Department of Agricultural Economics. These questionnaires will be summarized by Mr. Philip Shiff, and the study should be complete by June 15.

The questionnaire is designed to get information from retail store operators. It is worded in such a way that, it is hoped, information will be uncovered which will give us a clue to some of the motives behind the merchandizing methods or lack of merchandizing methods on the part of retail store operators. For instance, we are attempting to find out whether they prefer packs of uniformly sized apples, packs of standard graded apples (both eating and cooking), the type of container preferred, whether or not campaigns such as "The McIntosh Apple Week" were considered successful, what types of advertising sell the most apples, whether or not consumers ask for apples by variety or by brand, whether they prefer to sell eating apples by count or not, what the effect would be on demand volume and price if all apples were free from damages and bruises, how serious is the condition of apples when they reach the retail stores, what, in the experience of the store operators, is the best selling price for eating and cooking apples, what determines the retail price that store operators ask for apples, and suggestions as to how local apple growers could help to sell more local apples.

It is too much to hope that the answer to all of the above questions can be found but those working on the project are optimistic that some good will result from the work.

G. W. Westcott.

Why Keep Accounts?

Farmers are business men and farming is a complex business. The successful operation of a farm requires making many decisions and adjustments as to farm organization, farm practice and marketing.

The first step in determining what adjustments will make your farm more profitable is for you to determine your financial status. You should know what your assets and liabilities are, and by keeping farm accounts, find whether your business is profitable or unprofitable, and why. With these facts before you, you have a basis for wise and intelligent action. You must plan and make decisions for your farm as a whole. It is the intelligent use of all the factors which you have at your command that tends to make a favorable money income.

In order to make record keeping as easy as possible for Massachusetts farmers, the Farm Management Department at the State

College has prepared a new Farm Account Book which provides you with a simple yet accurate record of your farm business. This book provides for an inventory and for a record of cash farm receipts and farm expense. These records will give you a financial picture of the whole farm business; will show whether the business is profitable or unprofitable; will help you determine the strong and the weak points in the organization and operation of the farm and will serve as a basis for making adjustments which may make the farm more profitable in the future.

An increasing number of Massachusetts farmers are keeping such records each year. Since summarizing the record is perhaps the most important part of record keeping, the Extension Specialist in Farm Management is planning to assist any farmers who desire help in summarizing their accounts and in studying their farm businesses. Confidential reports will be prepared for each farmer. Some averages for the group of fruit growers who submit their records will also be prepared. These will be valuable as a standard for making comparisons.

This new Massachusetts Farm Account Book may be obtained from your County Agent at a very small cost. Why not get a copy today and plan to start your record on February 1? Roy E. Moser.

Dutton Tells of Auction Market Activities

Chester F. Dutton, auctioneer at the Farmer's Regional Market in Cambridge, says in a recent letter, "The auction is going very well. Up to January 1, have sold 154,000 packages at about \$147,000. The number of packages fell off a little this past fall from a year ago, but more farmers are using the auction. Good apples are finding ready sale at fair prices; Fancy Macs from \$1.25 to \$1.50. Best sale at \$1.67½ for common storage fruit. Fancy Baldwins are bringing around a dollar. Only Fancy apples are wanted now. Looks like the February market is going to be tough as there are heavy cold storage holdings around here, and at the price this year not many farmers will want to put in extra money to hold into March and April. This may flood the market the last of February. The best money in apples was before Thanksgiving with fair prices until the holidays. If ever there was a year when New England growers should pack a uniform package and put ciders in a cider mill rather than a store at 9 lbs. for a quarter, this is the year. I have had a lot of poor apples and although they bring 35 or 40 cents, they only tend to push down the whole price level. I often wonder if it would be possible to put over a grade and package law in New England. If not, in a few years we'll have the '10 lbs. for a quarter' trade and others will have the '5¢ each' market.

"The only varieties that are selling are McIntosh, Baldwin and Delicious, with Cortland next. Greenings are running around 60¢ and no real interest in other varieties. Have had loads from New Hampshire, Connecticut and in Massachusetts from as far as Pittsfield, with the usual heavy volume from the Granville boys."

Shaw Honored by A.S.H.S.

At the recent Indianapolis meeting, Dr. J. K. Shaw was elected President of the American Society for Horticultural Science,



the national organization of research workers and teachers in the field of Horticulture. The Society was organized in Boston in 1903. Dr. Shaw is the 30th president and the first one to be selected from New England. This society holds meetings annually with the American Association for the Advancement of Science and the Proceedings of the Society contain much of the latest information of the progress of Horticultural Science. The next meeting will be in Richmond, Virginia in December, 1938.

A Message from the N. Y. & N. E. Apple Institute

This is the first of a series of topics (by Wallace I. Helie) with regard to the work of the New York & New England Apple Institute, Inc.

"I find that few fruit growers of Massachusetts know what is going on in this merchandising program which the New York & New England Apple Institute, Inc. is trying to conduct," says Mr. Helie. "In these brief topics I am going to point out some of the important things which can and must be done to make our industry a more thriving one than it is at the present time.

First, I have been working in close connection with some of the independent grocers' associations in the New England States. Recently, I attended a meeting of the Cape Cod Grocers' Association at Hyannis, Mass. and I understand that these grocers are unable to get any real nice apples in that territory. I wish someone would get in touch with the president of the Association and take care of that area. I think a lot of business can be done down there on apples.

A good many complaints have been received in this office with regard to bruised apples, but I find that the apples are bruised after they leave the farm. Be as careful as you can and see that the apples reach the market in the 'pink of condition.' Pack them well so that they will be attractive to the consumer. A good many cheap apples from the South and West are coming in at the present time but we have to face this competition with a better pack and with more attractive displays.

I find that good fruit, properly displayed, will sell in any store. All of you have retail outlets. Be sure to get your dealer to display his apples in the same manner that he would display his oranges. 'The National Apple a Day Sale' is to be conducted during the week of January 29th to February 5th. I am contacting the officials of the most prominent chains and independent outlets to back up this sale. I will very much appreciate any suggestions the growers care to offer."

Items from Here and There

After 33 years of service in the New York State Agricultural Experiment Station, U. P. Hedrick retired as Director, January 15. His successor is P. J. Parrott who has served as Station Entomologist for many years.

The United States cranberry crop totalled 785,500 barrels in 1937, compared with 504,300 barrels in 1936 and 589,220 barrels 5-year average from 1928 to 1932. The crop last fall is the largest on record. The Massachusetts crop amounted to 485,000 barrels, New Jersey 160,000, Wisconsin 115,000, Washington 21,000, and Oregon 4,500.

At a recent large meeting of fruit growers in the Midwest, a vote was taken to determine the general opinion as to the best planting distance for peaches. The following figures show the percentage of growers who favored one planting distance over another: 18' x 18', none; 20' x 20', 1.5%; 24' x 24', 55.5%; more than 24', 43%. In other words, more than 95% of the growers at this meeting were in favor of planting peaches more than 24 feet apart each way.

Few fruit varieties have stood the test of time better than the Montmorency cherry. This sour cherry originated in the Montmorency Valley in France hundreds of years ago and has been cultivated in America for more than 100 years. At present, more than 70% of trees in the leading sour cherry producing sections are of the Montmorency variety. No other sour cherry is adapted to so wide a variety of soils. The tree is hardy and productive while the fruit meets the exacting demands of consumers and processors.

Even peach fuzz has value, according to this story in The Furrow. "When marketers ran some peaches through a machine equipped with brushes to take off the fuzz and make them more attractive to the eye and more pleasant to eat, they found the peaches became infected with brown-rot about twice as quickly as before. The organisms enter through the broken hair sockets and start decay, according to federal tests."

Quoting from a recent issue of Better Fruit, "Better control of cull apples from the two great producing districts in the Northwest is forecast by the success of Union Fruit Producers, Inc. in their sign-up campaign for the coming season. In Wenatchee, prospects are bright for an early sign-up of 70 per cent of the tonnage, and in the Yakima district a vigorous campaign is being waged to accomplish the same result there."

Investigations in irrigated orchards show that an extremely heavy crop of blossoms produced by apple trees and pear trees is common on trees that have not received, during the previous summer, as much water as would be to their advantage in making good growth. The slow state of growth resulting from the low water supply during summers of bright sunshine is commonly followed by a very heavy bloom and the trees put out more foliage than they can carry through the summer in good condition. Heavy fruit thinning and heavy pruning is ordinarily required to cause such trees to produce fruit of even medium size and large fruits are seldom produced by such trees even though the crop may have been thinned to a very small percentage of the total blossoms produced.

FRUIT NOTES - February, 1938

W. H. Thies
Extension Horticulturist

Trends in Fruit Production and Consumption

The per capita consumption of apples in Canada has declined from 112 pounds in 1899 to 58 pounds during the period 1930 to 1934. There has been also a marked decrease in per capita apple consumption in the United States. The reasons for this decrease are not entirely clear. Undoubtedly one factor has been the phenomenal development of the citrus industry. A few statistics will make this clear.

Average Annual Production in United States (Approximate)

	<u>1895-1900</u>	<u>1919-1923</u>	<u>1932-1936</u>
Apples (bushels)	186,000,000	163,000,000	136,000,000
	(1889)		
Oranges (boxes)	4,400,000	29,800,000	53,200,000
Grapefruit "	10,000	7,500,000	19,500,000
Lemons "	560,000	4,500,000	7,600,000

The development of the citrus industry has by no means reached a maximum. Extensive plantings in Texas and other states are tending to increase the citrus acreage. For instance, in 1920 there were practically no oranges shipped out of Texas. In 1936 approximately two million boxes found their way to markets outside the state. California and Florida, however, produce the bulk of the orange crop.

Grapefruit are grown largely in Florida with new plantings on the increase in Texas and Arizona. California produces practically all of the lemon crop. Lemon production is thus centralized and prices are relatively stable. Orange and grapefruit prices, on the other hand, fluctuate tremendously. The trends in citrus fruit production would seem to presage hard times for the apple grower. Undoubtedly this is true for the marginal class. But the better growers do not fear citrus competition. Citrus fruits can never replace deciduous fruits entirely because their uses do not coincide. There is always going to be a market for quality apples, pears, etc., that can be sold at a reasonable price. In short, that grower is going to succeed who can produce high quality fruit at low cost.

Issued by the Extension Service, Willard A. Munson, director, in furtherance of Acts of May 8 and June 30, 1914. Massachusetts State College, United States Department of Agriculture, and County Extension Services cooperating.

Quoting from the editor of Canadian Horticulture, who recently summed up the problem facing Canadian apple growers,-- "To meet the situation, our apple men must plant only varieties of high quality, with attendant standardization of packs, leaving culls, and the lowest grades for disposal in by-products, and must find ways and means of informing the public on the value and uses of the apple." Our own growers might well consider this advice.

Lawrence Southwick

Notes on Nitrogenous Fertilizers

Missouri Research Bulletin No. 273 reports studies of Cyanamid, nitrate of soda, and sulfate of ammonia in the apple orchard. While there were certain significant differences in the behavior of the three materials there were no marked differences in either growth or yield of the trees. Fall and spring applications of all three materials were compared and it was concluded that fall applications were as good or better than spring applications. Fall applied nitrogen was rapidly absorbed by the roots in the fall and winter and moved to the twigs the following spring at about the same time as in the case of spring applications. Abundant moisture seemed to favor the decomposition of Cyanamid. Trees can apparently use nitrogen in the form of ammonia if the soil acidity is about pH₆. A blue grass sod takes up much nitrogen, especially from spring applications. Fall applications of nitrogen seem to be gaining favor in the southern apple regions, but may be a little risky where severe winter weather prevails.

J. K. Shaw

Northeastern Apples Being Featured

The following observations reported by Wallace I. Helie will be of interest to Massachusetts apple growers:

Bigger and better apple displays have been shown in Massachusetts during the past month. The chain stores are being urged by a national association to cooperate more with the local fruit growers in disposing of local apples. The independent fruit growers associations in Massachusetts have had more requests than ever before to help dispose of native apples. Competition has been extremely keen, especially from the south, but native apples have been featured and advertised in all of the leading newspapers throughout Massachusetts each week. In a recent discussion with the divisional apple buyer of one of the larger chain stores, it was learned that a tremendous drive is going to be made on New England apples beginning next week. In our discussion, it was also learned that a tremendous increase in the volume of sales has materialized since the first of February. In my estimation it is believed that since certain Southern varieties are scalding so badly other than native varieties will not be featured so prominently from now on by any of the chain and independent dealers throughout New England.

Practically all of the commission men in Massachusetts have featured nothing but native apples. In the independent stores a great deal of cooperation has been had through the efforts of the local trade associations throughout Massachusetts. Moving pictures have been shown throughout the state showing the retailers the ways of handling and merchandising native apples. John Rice, president

of the Massachusetts Fruit Growers' Association, was invited to give a talk on one of these occasions to about two hundred retail grocers. Merchandising ideas were discussed and a real educational program was brought out. Advertising material was freely given and recipe booklets. A radio program was put on by a large chain unit over one of the networks and a very prominent fruit grower's wife was interviewed in regard to the use of apples. Several hundred requests for apple recipe folders have been received and sent out as a result of this radio talk. Apples have received front page publicity, and people throughout New-England have been given an opportunity to become better acquainted with our New England grown apples.

Many Apples Still in Cold Storage

Stocks of apples in cold storage on February 1, 1938 totaled 26,000,000 bushels. This is the largest February 1 cold storage holding on record, exceeding that of 1937 by 50% and the 1927-36 average by 28%. The great increase is in the eastern and central states. The storage stocks in the western states, though larger than in 1937, are slightly below average. The total exports of apples for the current season through December amounted to 5,300,000 bushels. This amount exceeds that of a comparable period in 1937, but is smaller than those of recent years of large crops. Apple prices in terminal markets in the East and Mid-West remained steady during January, thus leveling off a downward trend experienced up to the close of 1937. In years of heavy production it is not unusual for prices to decline materially after October. This was particularly to be expected this season because the natural price-depressing effect of heavy supplies has been accentuated by declining consumer purchasing power. For example, the index showing industrial worker income dropped from 90 in October to 76 in December, 1937.

L. Southwick.

Apple Exports

It is of interest to notice the concern of Canadian apple growers over a possible new trade agreement between Great Britain, Canada, and the United States. In 1932 the British Preferential Tariff was put into effect to aid the Canadian grower. As a result imports of Canadian apples into the United Kingdom have increased by 48 per cent with a corresponding decrease of American apple imports amounting to about 45 per cent. Almost one-half of Canada's commercial apple crop is exported. Most of these exported apples go to Great Britain because of the specific price advantage over competitors such as American growers. Thus, a Massachusetts grower must pay a duty of about \$1.12 per barrel more than a Nova Scotia grower. It is no wonder that Canada is solidly against any change.

This winter, imports from the United States have comprised about one-half the total apple imports and 100% of the pear imports of the United Kingdom. For instance, from December 8 to February 9 the volume was about 1,250,000 bushels of apples and 400,000 bushels of pears. The price for apples has averaged somewhat under two dollars per bushel. A majority of the American apples have been shipped from Washington, Virginia, New York and Pennsylvania. As usual, export markets will take approximately 10% of our 1937 commercial apple crop. It is quite possible that a new trade agreement

would increase our exports to the British Isles. Growers, however, particularly those in Massachusetts, need no reminder that the best market to develop is the one nearest home. It should be the aim of every fruit grower, every fruit handler, and every fruit retailer to so popularize apples that the steady decline in per capita consumption in our own United States will be stopped. There are plenty of apple consumers here, and they will consume if they get what they want.

L. Southwick

Control of American Foul Brood

American foul brood is an infectious disease of the immature or larval stages of the honeybee. It is caused by a microscopic spore-forming organism known as *Bacillus larvae*. This bacillus is carried to the larval bees in the food. Under favorable conditions the organism grows and causes the death of the young bee, usually in the late larval or early pupal stages. The honeybee is the only known host of this organism. Warm-blooded animals are not affected by it. It is of utmost importance that every beekeeper should become familiar with the symptoms of this and other bee diseases in order to avoid confusion of the various diseases and to prevent their spread. Since the recommended treatments are not the same for the various brood diseases, the importance of the foregoing statement is readily seen. In order to familiarize oneself with the symptoms of bee diseases, consult either U.S.D.A. Farmers' Bulletin 1713 or U.S.D.A. Circular 392.

As regards the control of American foul brood it is the opinion of many of our beekeeping specialists that burning of diseased colonies is the best method of control. This method is briefly as follows. The bees are killed, preferably in the evening, by placing about a tablespoonful of calcium cyanide in the hive entrance. It may be well to place a small amount of cyanide in the top of the hive to insure that all the bees will be killed quickly. The hive should then be carried to the side of a pit at least 18 inches deep which has been dug previous to the killing of the bees. A brisk fire should be started and the bees and frames should be burned. Following this the pit should be filled with dirt.

The hive bodies, covers, and bottom board can be saved. These should be thoroughly scraped and then washed with a hot lye solution or scorched with a blow torch. If the equipment is washed it is necessary that the washing solution be disposed of in such a way as to prevent bees coming in contact with it. If there is any considerable amount of honey in the supers, it can be sold. However, the greatest care must be taken that at no time does the honey become accessible to bees. Any equipment used in the preparation of such honey for market should be thoroughly cleaned with soap and hot water. Some beekeepers contend that the disease can be controlled by shaking. This method is not recommended for general use. The opinion of some of our beekeeping specialists is that there are only a few instances where the shaking treatment can be utilized. For further details concerning the use of this method, consult U.S.D.A. Farmers' Bulletin 1713.

F.R. Shaw

Handling Neglected Orchards in the State of Washington

The problem of neglected orchards in Washington is handled by the local horticultural office, which is under the direction of

the State Department of Agriculture. That office handles all the regulatory work in connection with the inspection of fruit, orchards, nurseries, etc. The orchard, if reported as neglected, is first inspected in the early spring for scale, and if San Jose scale is found, the owner is given fifteen days in which to apply the dormant spray. If the owner does not apply the spray, the county has a right to do so and apply the cost to the property just the same as taxes are assessed against the property in question. Very much the same procedure occurs if the orchard becomes neglected during the summer and codling moth larvae are found. In this case, however, a ten day limit is usually given for the orchard to be sprayed or the infected fruit removed.

During recent years the problem of cleaning up the neglected orchard is handicapped by lack of county funds, and, in some cases, the infected orchard has been allowed to go unsprayed. In the case of the orchard so completely neglected that it has to be condemned, it is the general program of the local horticultural office to try and secure waivers from the owners to remove the trees, the county putting up the expense for such tree removal. The horticultural law gives the horticultural office considerable authority, but when it comes to going to court, it is rather a long drawn-out procedure and this method is seldom resorted to. Pressure is usually put on the owner or mortgage holder to give waivers for tree removal when such is necessary. (The foregoing statement about neglected orchards was supplied by W. A. Luce of Washington, a former resident of Massachusetts.)

Damage to Peach Buds Extremely Variable

Samples of peach buds from many different orchards have been sectioned to determine the extent of killing due to the cold spell in January. Injury varying from none at all to almost 100% has been noted. Following are some of the findings of J. S. Bailey concerning samples submitted by different growers:

It appears from the limited amount of information available that the 1938 peach crop prospects are good in most places in the State in spite of dangerously low temperatures on seven occasions. Orchards situated in unfavorable locations where cold air could collect on still nights lost most of their fruit buds. Massachusetts is situated so near the northern limit of peach growing that the choice of a site with good air and water drainage becomes of first importance. Keep the peaches out of the hollows where cold air collects on still cold nights and away from slopes where cold air can drain down through the orchard from above.

FRUIT NOTES - March, 1938

W. H. Thies
Extension Horticulturist

New Aspects of Orchard Fertilization

It is desirable to consider the fertilizer needs of the tree as distinct from the fertilizer needs of the sod or cover crop, according to J. R. Magness in a recent issue of the American Fruit Grower. Rarely, if ever, does a tree show a clearcut response to an application of phosphorus. Yet it is well known that cover crops, including sod, are rather heavy phosphorus users. In the same way, the cover crop will respond more often than the tree, to an application of potash.

The maintenance of a good cover crop of sod is necessary, (1) to prevent erosion and the loss of valuable surface soil, (2) to maintain a supply of organic matter which is the greatest reservoir of plant food in the soil, and (3) to insure penetration of water. On many soils neither a good sod nor other type of cover crop can be maintained without fertilization. This is particularly true as the trees grow older. And if the grass is not as dense and thrifty as it should be, the application of a complete fertilizer will unquestionably improve the cover. Even 100 lbs. per acre of such fertilizer broadcast over the area between the trees will increase its growth.

From the standpoint of the tree itself, nitrogen may be most economically applied over those areas of the root zone where there is relatively little competition from the cover crop. In most mature orchards there is a rather limited growth of sod under the spread of the branches. At the same time the development of roots is relatively dense beneath that area. It is therefore safe to assume that the tree will obtain a larger proportion of the nitrogen applied beneath the spread of the branches than if applied over the entire orchard floor. And if a complete fertilizer is used in feeding the tree, the amount should be calculated on the basis of the tree's need of nitrogen. Thus more than 3 times as much of a 5-8-7 fertilizer will be needed per tree to supply the needed nitrogen, as if nitrate of soda were used. And as suggested above, there are definite advantages in broadcasting the complete fertilizer over the entire orchard floor instead of placing it in a ring around the tree.

Locating the New Orchard

With the disappearance of frost in the ground we find a considerable number of fruit growers in Massachusetts digging holes for the planting of new trees. In some cases we fear that too little attention has been given to the location of the new

orchard. A number of blocks to be planted this spring are on the sites of winter injured trees recently cut down. The size, vigor and past production of such trees is one excellent indicator of the adaptability of that particular location. Another help along this line will be found in the soils map of the county. Here it is possible to get a general notion of the soil type on each farm along with a brief description and a statement of its adaptability for different crops. Both of these things may be learned by a few minute's study of the soils map and the accompanying description. If in doubt about your particular farm, either your county agricultural agent or the writer will be glad to be of assistance.

Many thousands of fruit trees in New England and hundreds of individual blocks are undoubtedly being carried along at a loss because they were planted in the wrong place. Poor drainage, droughtiness and shallowness are things to be avoided. The ideal orchard soil is well drained and yet retentive of moisture, and it shows only a gradual color change as we dig into the subsoil. It should contain a considerable proportion of the finer, clay-like particles but the subsoil should not be too compact. A site with good air drainage is also important. With some people, it seems like a waste of good land to set fruit trees on a type of soil which is capable of growing a good hay crop. To do otherwise, means giving the orchard a permanent handicap.

Variety Trends

It was noted in the February issue of Fruit Notes that total apple production in the United States has dwindled in the past 35 years. Decrease in total production, however, has not proceeded so rapidly as decrease in total number of bearing trees. Efficient management has greatly improved the yield per tree. Marginal growers are being forced out of business. Now it is generally believed that further retrenchment in the apple industry is not necessary. In years of average crops, consumption takes care of production at a price level consistent with fair returns for the fruit grower's investment and labor. If the deciduous fruit growing business is to maintain a status quo, more planting must be done in the near future. Today one-quarter of the bearing trees are over 30 years of age, and fully one-half will average more than 26 years of age. These trees have passed their prime and may soon be expected to turn out smaller crops.

What varieties should be planted is largely the individual grower's problem. Nevertheless, certain facts may help to guide his decision. Some varieties prominent 25 or 50 years ago are not now recommended for planting. According to a recent survey in New York, fifty years ago Ben Davis, for example, brought more per bushel than Northern Spy. Today they sell for approximately 40% less. In recent years McIntosh has not only brought the highest price but production per tree has been the greatest of any variety. In New York, with conditions similar to ours here in Massachusetts, McIntosh has been the leading variety planted in all areas. Rhode Island Greening, Delicious, and Cortland have also been planted to a considerable extent in some sections.

Taking the United States as a whole, Delicious plantings have exceeded those of any other single variety. Varieties that have generally enjoyed increased planting since 1910 include Delicious, Stayman, McIntosh, Yellow Transparent and Grimes Golden. Those showing decreased plantings include Ben Davis, Rhode Island Greening, Baldwin and York.

More than ever before consumers are demanding high quality in foods. Apples are no exception. Furthermore, fancy prices of former years cannot be expected in the near future. High yields must compensate. On the basis of these demands the McIntosh variety probably excels today under our conditions. What the future may bring in improved varieties is problematical. Growers should follow carefully the results of breeding work and subsequent testing of new sorts.

Lawrence Southwick

Evaluation of Apple Varieties for the Northeast

"Classification and Evaluation of Varieties of Apples Grown in the Northeastern States" is the title of a mimeographed leaflet recently prepared by J. K. Shaw of the State College staff in cooperation with other horticulturists in the Northeast. More than 100 varieties, new and old, are rated according to their popularity in the different Northeastern States. Here are some of the varieties we are advised to discard: Alexander, Hubbardston, Maiden Blush, Wolf River, Yellow Belleflower, etc. Other items discussed are: basis of evaluation and classification, regional variations, older and newer varieties, mutations or bud sports, evaluation of varieties by districts, and variety synonyms. This publication of about a dozen pages helps to clarify the apple variety situation in the Northeast. A copy may be obtained by addressing a postcard to the Pomology Department, M. S. C., Amherst.

The Orchard and Soil Acidity

A recent editorial in the American Fruit Grower presents a common sense view of the relation between soil acidity and fruit production. According to the author, fruit trees have been found to thrive at pH values of from 4.2 in Ohio and New York, to pH 8. in Washington and California, and even 8.5 in New Mexico. This represents a tremendous range in acidity when we consider that a soil of pH 4. is 10 times as acid as one which rates pH 5. Since many of our agricultural crops are strikingly benefitted by the use of lime, it raises the question about fruit trees. Do fruit trees thrive better on a limestone soil? Should they be limed occasionally to improve their growth, production, or the quality of the product?

The whole question of acidity is so tied up with fertility, drainage, aeration, organic matter, etc., that it cannot be considered separately. It is true that sulphate of ammonia makes the soil slightly more acid after several years use while sodium nitrate has no measurable effect and cyanamid reduces the acidity slightly. But in general, the tree seems to be very tolerant of acid conditions. With the cover crop, however, the situation is quite different. Here is an agronomic problem, and whether the crop be grass, weeds, or other vegetation, lime may be required for a satisfactory growth.

Recent investigations suggest the need in certain soil types for an application of lime to provide the element calcium. From the standpoint of the tree, it may be concluded that soil drainage and the physical structure of the soil may be of greater importance than the condition of acidity or alkalinity in itself. The practice of applying lime beneath fruit trees for the purpose of sweetening the soil, or to provide calcium as a nutrient, may have application in very limited areas. It seems to have a much wider application in New England as a means of stimulating the cover crop.

Washington Stresses Thoroughness in Spraying

The 1938 Apple Spray Chart for the state of Washington tells how to spray, in no uncertain terms. In presenting the details of the 6 cover sprays, we find in red type, the words "Spray Thoroughly" no less than 27 times. In addition, the words "Spray Very Heavily," likewise in red, appear 6 times where advice on a very severe infestation of codling moth is given. The words "Test Your Coverage" appear in red in connection with the last 5 cover sprays and to top things off there appears at the top of the spray schedule these words, "Major efforts must be directed towards first brood elimination."

Here in Massachusetts we have no very serious problem with codling moth. But we have a very able substitute in the form of apple scab. Our fight against primary infection of apple scab is very similar to the fight against first brood codling moth in the Northwest. If the Washington grower loses out in protecting his crop against the first brood, he might as well go fishing the rest of the summer. The same is true about primary scab infection in Massachusetts. The critical time for scab control is from the Pre-pink stage of bud development in late April to the Calyx stage around the first of June. Incidentally, in the last issue of the American Agriculturist will be found an excellent article entitled "Going After Apple Scab," by O. C. Boyd of the State College staff.

Starting the Young Tree Right

The month of April seems to be a fitting time to say something about young fruit trees. You remember the old saying "Train up a child in the way he shall go, and when he is old he will not depart from it." That statement is at least partially true. We never seem to get completely away from those early influences. The fruit tree, too, is a responsive individual. What happens to the tree, whether it be apple, pear, or peach, during the first two or three years, determines to a large extent what it will be later on.

The writer is a firm believer in getting the young tree off to a good start. Not so much by pruning it into submission the first year, but by doing whatever is necessary to make it grow rapidly up to bearing age. Of course we are in favor of getting rid of weak crotches when the tree is planted and in giving the "leader" a real lead over any of the branches, but another thing of importance is that the tree become firmly established the first year and actually make some growth.

The second year is equally important. If everything goes well, the leader will have pushed ahead and there will be an assortment of scaffold limbs in the making. Let's not be in too much of a hurry to get rid of the extra limbs. Dominance of the leader and the prevention^{of} whorls of side branches which tend to throttle the leader are of more concern. If a low side limb shows signs of outgrowing the rest of the tree, it should be curbed by cutting back or by removing, entirely.

When the third growing season rolls around the tree should be making a terminal growth of at least 15 or 18 inches and should show unmistakable signs of going somewhere. Prushiness is not a serious matter so long as we have a strong framework in the process of development. But so often something happens during those first three years. Winter injury, faulty pruning, starvation or drought may give the tree a set-back. And if it does start growing afterwards, it is likely to break out at unexpected points below the leader, and as a result, the framework has to be entirely revamped. A tremendous number of such trees are to be seen in bearing orchards of the present day. The moral is briefly this. Keep the young tree growing from the start and then do just enough pruning to encourage a balanced framework. Good growth, in some cases, is easier attained by a liberal mulch than by a double application of fertilizer.

Speaking of Small Fruits

Setting of strawberry plants as early in spring as the ground can be fitted is a wise precaution. Except on a heavy soil, May 1 should be about the dead line. The early set strawberry plant has an opportunity to become established and to develop its roots before the hot, dry weather of early summer. Such plants are also better able to develop strong runner plants in mid-summer. And it is the early runner plants which are most likely to produce good crops the following season. There is a definite relation between number of vigorous leaves on the young plant in the fall and the number of berries it produces the following spring.

The "bleeding" of grapevines often causes unnecessary worry. Experiments have shown that the bleeding which results from late spring pruning is not especially detrimental to the vine. March is an ideal time to prune the grape vine but it is far better to prune in April than not at all.

According to J. H. Clark of New Jersey, the tops of red raspberry and blackberry plants should be pruned back to about 4-6 inches when they are set out. If the canes are left too long they will produce a number of berries and in many cases the plant will not be able to produce both fruit and new sucker growth, so that there will be few new canes for the next year's crop. He also points out that the flowers should be removed from newly set strawberry plants before the fruit has started to develop. Plants allowed to fruit the first season will usually fail to produce a satisfactory number of vigorous runner plants.

There is still time to reorganize the raspberry and blackberry planting by narrowing the row and by removing weak and crowded canes. There seems to be a tendency to allow the

bramble row to become too wide. This makes picking more difficult, disease more prevalent, and the extra canes serve as weeds in the planting. Better quality berries are produced if the row is confined to a width of about one foot and if the weak and crowded canes are removed to allow an average space of perhaps five or six inches between. As regards cutting back, it is a common practice to remove enough of the tips to permit the plant to support its weight of fruit.

Two specimens of the raspberry or blackberry root borer have recently come in for identification. This pest is not often serious. The recommended control measure is to remove and destroy the affected plant.

The practice of mulching raspberries should become more common, particularly on the lighter soils. A good moisture supply plays a very large part in the production of a successful crop. A good mulch aids in the penetration of rainfall, prevents evaporation and if heavy enough, tends to discourage weeds. Raspberries may be mulched at any time of year but early spring is the desirable time, since the mulch aids in the conservation of moisture in the soil at this time.

A few trees of a dwarf species of plum which grows wild in Kansas, *Prunus angustifolia watsonii*, are being obtained this spring for planting on Cape Cod. The purpose of this shipment is to provide a comparison with the native beach plum, *Prunus maritima*. Professor F. A. Waugh, who ate sand plums as a boy in Kansas, has suggested this interesting comparison.

Deep freezing of the soil during the winter and the resultant heaving, has again emphasized the value of a liberal mulch in the strawberry bed. Heavily mulched plantings have come through in much better shape than those which were left exposed to the winter. Low temperatures with little if any snow on the ground is strong medicine for the unmulched strawberry bed.

A list of dealers in certified raspberry plants may be obtained by writing the Department of Pomology, M. S. C., Amherst, Mass. A list of varieties of fruits recommended for planting in Massachusetts, both small fruits and tree fruits, is also obtainable for the asking.

Items from Here and There

Last winter for the first time a citrus breakfast food was placed on the market. This new product, developed by the Florida Citrus Exchange, is made of oranges with peel and seeds removed, plus flour, bran, sugar, salt and cod liver oil. In the same way that citrus meal and citrus cannery refuse pulp are finding a market for 15,000 tons of citrus annually, Florida growers expect this new product to find favorable outlet for a large amount of surplus fruit.

The apple is primarily a carbohydrate. Its makeup is approximately as follows: Sugar 12.2%, Water 84.6%, Protein .4% Fat .5%, Fiber 1.2%, Cellulose .8%, and Ash .3%. Apples have long been used in the treatment of certain digestive disorders.

But the apple is not a drug. It is a palatable fruit which maintains health giving and disease preventing properties, whether eaten raw or as apple sauce, baked apple or apple pie. In 1931, a German company placed on the market an apple powder known as "Aplona." This powder included the skin of the apple. More recently, Dr. Manville of Oregon, has developed another apple powder known as "Apella" from cored and peeled apples. Apple powder is being used in the medical profession and is producing the same results as apple pulp. It has been successfully used in one case in treating an infant 11 days old.

It's a long jump from New York to Florida but that's the trip made last winter by J. N. Demuth of Pembroke, New York with 300 colonies of bees. The bees were transported by truck in two trips. The owner expects to bring back between 700 and 800 colonies. Grove owners welcome "tramp" beekeepers because Florida bees are reported to be inactive in winter while the northern bees do a good job of pollinating the citrus trees.

During the past 30 years the California Fruit Growers' Exchange has spent more than \$24,000,000 for advertising. This amounts to a little more than 1% of the delivered value of the fruit. About \$1,300,000 was spent for advertising during the past year.

Orchard mice prefer relatively succulent vegetation. This helps to explain why they attack the trunks and roots of apple trees. The juicy inner bark of an apple tree offers a tempting morsel when grass, the usual food supply, becomes dry and woody. Even in winter the lower portion of the trunk and the roots remain in a condition which make them attractive to mice. And, of course, the nearness of "mouse runs" is another factor. Observations in Massachusetts this spring show very little tree injury where the newly developed mouse bait was used in the runs last fall. Elsewhere a considerable number of girdled trees has been observed.

The Farm Chemurgic movement is an attempt through chemical research and manufacture, to find new uses and hence new markets for raw farm products. The movement was started three years ago at Dearborn, Michigan. Researches sponsored by the National Farm Chemurgic Council include the manufacture of starch from sweet potatoes, the paper and news print industries fostered in the pine lands of the South, the production of various oils essential in American industry and heretofore imported from abroad, the manufacture of plastics from soy beans and from sawmill waste, and the manufacture of industrial alcohol from a number of farm crops.

According to J. C. Snyder of Pullman, Washington, alfalfa plays an important role in the Irrigation Branch Experiment Station orchard, partly because it aids in water penetration. Wherever the irrigation water amounts to less than 40 acre inches for the season, he states that the fruit averages smaller in size.

FRUIT NOTES - April, 1938

W. H. Thies
Extension Horticulturist

"In Those Days----"

We are indebted to W. E. Piper of the Division of Markets for the following story which indicates the present day package situation on the Boston Market.

Not all that goes on in busy city wholesale farm produce markets is hard boiled give-and-take. Beneath the surface there lurks a strong sentimental feeling that often crops up when market men get in a reminiscent mood. Such was very much the case in Boston's famed Faneuil Hall Market one early afternoon last week when someone happened to mention barreled apples.

"Barreled apples," chirruped an old timer, "Barreled apples from Maine with split hoops and home-made liners. Those were the days,--barreled apples off the Bangor boat."

"Many's the day," he reminisced, "when I've seen a half-dozen wagon loads hauled into the market from the wharf, backed up to the curb on North Market Street."

"Yes sir," interrupted another veteran joining the group. "Remember Henry Stevens on top of the load cracking 'em open with his hatchet."

"Hatchet!" broke in a bystander. "That reminds me. How long has it been since I've seen a hatchet? Now it's nothing but box openers, little dinky box openers. Toy tools I call 'em. Now the hatchet was a man's weapon."

"Sure it was," resumed the old timer, "and not only that, the hatchet was a badge of office. In those days when a man left a concern to go to work for somebody else, he didn't resign, he just turned in his hatchet."

"And the barrel, too," he went on. "That was a man's package. When you got hold of a barrel you had hold of something. And apples, all kinds of apples, Nodheads, Wolf Rivers, Ribston Pippins and what not."

"'And what not' is right," remarked another member of the group, wagging his head in recollection. "Eighteen barrels and, like as not, seventeen different kinds."

"You'll never see the likes of it again," yearned the old timer. "Those days are over. Come to think of it that may be what's wrong with the business. Maybe if we could get back to the old times, things would be better. Maybe what we need is for people to buy 'em like they used to, when they had a barrel of apples in every cellar."

And as the impromptu meeting broke up there was a general agreement that, while there will always be pros and cons on

the question of apple packages, there is no doubt that "a barrel of apples in every cellar" is the answer to the market problem.

Frost Damage in Europe

Heavy frosts over most of Europe during the week of April 15-21 caused serious damage to fruit crops. Freezing temperatures occurred in England, France, Switzerland, the Italian Tyrol, and Germany.

Damage in England is believed to be as severe as it was two years ago. Smudging, though tried, was abandoned as useless. The estimated percentage loss with different crops is as follows: strawberries, 100%; plums, 100%; cherries, 75%; bush crops, 50%; apples and pears, serious loss but extent not known.

Damage on the Continent extends as far south as the Italian Tyrol. The fruit crop is believed to have been totally ruined in Switzerland with serious apple damage in northern France and prune, grape, and walnut injury in central and southern sections.

These developments may be important to growers here since England and France are the leading importers of American apples and pears and both Switzerland and the Italian Tyrol are important apple exporters.

L. Southwick

Apple Advertising

The importance of apple advertising is brought out clearly when the national set-up is considered. There are eight regional groups (Pacific-Northwest fruits not considered).

(1) The New York-New England Apple Institute, (2) Appalachian Apples, Inc., (3) National Apple Institute, (4) Michigan State Apple Institute, (5) Illinois Apple Institute, (6) Northeast Kansas Apple Growers Association, (7) Idaho Fruit & Vegetable Advertising Association, (8) Washington State Apples.

These organizations use largely direct advertising through the mediums of newspapers, magazines and the radio and often of pamphlets in cooperation with retail agencies. Indirect advertising known as "publicity" is also utilized.

L. Southwick

Apple Prices and Storage Holdings

According to the Bureau of Agricultural Economics in Washington the failure of apple prices to show some seasonal rise this spring appears to be due to at least three important factors: (1) Storage stocks of record size, (2) A declining level of consumer purchasing power since late last fall, and (3) Small export demand relative to previous years of large supplies.

Cold storage supplies of apples in the United States on May 1 are indicated by the following figures taken from the last issue of the Special Apple Market Report.

<u>Year</u>	<u>Barrels</u>	<u>Boxes</u>	<u>Bushels*</u>	<u>Total Bushels</u>
1938	33,000	2,331,000	3,357,000	5,787,000
1937	15,000	2,258,000	1,226,000	3,529,000
1936	86,000	3,026,000	2,148,000	5,432,000
1935	68,000	1,804,000	1,557,000	3,565,000

(*Includes baskets, Eastern boxes and crates.)

Holdings of apples in cold storage in the Boston Market Area, including city of Boston, and country warehouses in eastern Massachusetts, are reported May 1 as follows:

(1938) 5,787,000; (1937) 3,529,000; (1936) 5,432,000; (1935) 3,565,000. Numbers refer to total bushels.

Twilight Orchard Meetings

This is the season for orchard get-togethers to review the pest situation and to observe items of interest in a neighbor's orchard. The meetings held thus far this spring have been well attended. The complete schedule of meetings in three sections of the state is indicated below. Other meetings are being planned in Middlesex and Franklin Counties.

<u>Worcester County</u>		
<u>Date</u>	<u>Orchard of</u>	<u>Town</u>
April 28	Chester Green	Boylston
May 4	William R. Westcott	Harvard
11	Donald MacCollom	Sterling
12	Clarence F. Morse, Woodstock Rd.	Southbridge
13	Dwight Baldwin	Westboro
25	Roger Bemis, Old No. Brookfield Rd.	Spencer
26	Lester Pease, Brooks' Village	Templeton
June 1	Henry Andrews, Pearl Hill Rd.	Fitchburg
8	Everett E. Goodell, Davis St.	Northboro
9	Richard L. Everit	Barre
15	L. C. Blanchard, Justice Hill	West Sterling
July 12	A. W. Powell	Brookfield
13	Arthur Robinson, Near Milford-- Uxbridge Rd.	Mendon
20	Myron Wheeler, Summer Rd.	Berlin
21	William A. Green	Oxford

<u>Essex County</u>		
April 28	Essex County Agricultural School	Hathorne
May 5	Brooksby Farm	Peabody
12	Long Hill Orchards	West Newbury
19	Ellis Orchards, Porter St.	Melrose
26	Greycroft Farm	Wenham
June 2	Gilbert Wallace, Chadwick Rd.	Bradford
9	Porter I. Livingston, Lowell St.	W. Andover

<u>Hampshire and Hampden Counties</u>		
May 10	Bay Road Fruit Farm	Amherst
17	E. S. Hertley	Westfield
24	F. A. Upham	Belchertown
31	L. W. Rice	Wilbraham
June 7	Wolf Hill Orchards	Southampton
14	G. S. Gay	Three Rivers
21	Fuller Orchards Inc.	Haydenville
28	R. G. Dickinson	Granville
July 5	Park Hill Orchards	Easthampton

(Meetings are held at 7 P.M. Daylight Saving time.)

Two New Apple Products

A few facts concerning "New West" apple juice and a new apple powder have been obtained from J. C. Snyder, Extension Horticulturist in the state of Washington. The apple powder which is made for medicinal purposes has been accepted by the Medical Association. A rather complete description is found in the November issue of the Journal of the Medical Association. Cliff Ross of Selah, Washington is directly connected with this product. The apples are shipped from Washington to California where they are dried and ground. A one-pound package of the powder is sold by Frederick G. Stearns of Detroit and is also used for supplying the medical trade with samples.

Cliff Ross of Selah, Washington is also connected with the manufacture of the "New West" apple juice. This juice is sometimes referred to as "Doctor Schoop's" apple juice. It is claimed that this material contains all of the desirable characteristics contained in fresh apples. H. H. Mottern, Chemist, U.S.D.A., Pullman, Wash., who has been doing considerable work on fruit products, questions whether or not it contains an appreciable amount of Vitamin C. It is understood that this juice is a product of distillation and for that reason is quite different from apple juice obtained in the usual way.

Some Effects of Sulfur Dust on the Soil

The acidifying effect of sulfur dust on the orchard soil is becoming apparent in Massachusetts orchards where dust has been applied for a number of years. In at least three orchards the use of sulfur dust has brought about a complete change in the flora beneath the trees where the soil acidity is now totally different from that of surrounding areas. It is reported that an application of sulfur at the rate of 1,000 lbs. per acre has been known to change the acidity by as much as one pH unit. In other words, such an application may increase the acidity from an original acidity of pH 6 to pH 5.

In one Massachusetts orchard where sulfur dust has been applied over a period of 15 years, there is now no vegetation, except moss, over the area extending from the trunk to the tips of the branches. A test for acidity of the surface soil under one tree showed it to be extremely acid (pH 3.6). At two inches it was pH 3.8; at four inches pH 4, and at 24 inches pH 4.5. Beyond the tips of the branches of many trees there is now a growth of sorrel and a little beyond that, orchard grass is growing fairly well. A very complete set of soil samples has been obtained in and around this orchard to obtain a complete story of the changes in acidity resulting from the use of sulfur dust. Incidentally, the trees in all of the above orchards are still doing very well which makes it appear that a failure of the cover crop does not immediately affect the tree. Pennsylvania authorities say that the condition of the cover crop is an indicator of what the orchard will be 8 or 10 years hence. If this is true, and we have reason to believe it is, Massachusetts growers who are using sulfur dust at all extensively, must occasionally apply lime to the orchard soil in order to offset the effect of the sulfur. For unless we are able to maintain a good cover crop in the orchard we are in danger of unfavorable moisture relationships and at the same time we are losing a valuable reserve of soil nutrients including nitrogen.

Suggestions From an Agronomist

Any grower interested in producing mulch material outside the orchard will do well to consider the advice of R. W. Donaldson regarding seeding mixtures. On a moist to poorly drained soil, Reed's Canary Grass is recommended. The following mixture will insure a good crop of hay for mulching on soils which vary in the degree of drainage; Reed's Canary Grass 8-10 lbs., Orchard Grass 4-5 lbs., Timothy 3-4 lbs. If the soil is well drained and of good fertility Orchard Grass alone at the rate of 10-15 lbs. per acre is recommended.

If a soil is deficient in potash there is reason to believe, according to Donaldson, that a rather liberal application will give better results than the amount contained in the usual application of a complete fertilizer. The amount of potash applied per acre in a fertilizer such as a 7-6-6 does not average more than about 75 lbs. If 150 lbs. of potash is applied per acre the additional amount provides good insurance that the cover crop will obtain enough to make a better showing.. The reason for so little response from a light application of potash is not definitely known. A deeper penetration in available form is suggested as a possibility. Whatever the reason, the orchardist will probably get a bigger return on his fertilizer investment by making one liberal application than by making two light ones.

Standardizing the Apple Crate

The apple box commonly known as the "Northeastern Apple Crate" has come into use as far west as Indiana and as far south as Virginia. In the whole Northeastern section it is steadily replacing the bushel basket. With this increasing use a bewildering number of sizes and shapes has been developed. Recently an observer counted 16 sizes and shapes on the New York Market at one time.

To attempt voluntary standardization, 35 representatives of state fruit growers' associations, box manufacturers, commission merchants and the railroads, met in New York on May 13. After thorough discussion of the viewpoints represented and the problems involved, the following resolution moved by W. S. Campfield (Va.) was voted unanimously:

(1) That the area represented voluntarily adopt an apple box holding approximately $1 \frac{1}{5}$ bu. and that the dimensions be 17 x 14 x 11 in. inside measurements, except where refrigerator car loading demands variation from such dimensions, in which case a box 16 x 13 $\frac{5}{8}$ x 12 in. should be used.

(2) That it is the opinion of this group that this box should never be packed with a bulge.

(3) That this box should be called the "Approved Eastern Apple Box."

(4) That a report of this meeting be sent to the Secretary of each Horticultural Society in the territory and that such societies make every effort to persuade growers to use this box.

The 11 x 14 x 17 in. box was adopted again because of increasing evidence that (1) It holds, jumbled and without a bulge, the fruit from a well-packed bushel basket, with which package it must compete on the market. (2) It has been widely

accepted and is well known on the larger markets. (3) Largely because of this, smaller packages are coming to be penalized more than the lesser amount of apples in them would warrant.

A 1938 apple crop amounting to 70 per cent of last year was estimated in the states represented at the above meeting, which included the Northeast as far south as Virginia and west to include New York State. The Virginia crop is estimated at 50 per cent of last year.

R. A. Van Meter

Items from Here and There

The behavior of apple insects this spring is in keeping with an unseasonably warm April and early May. On May 9, W. D. Whitcomb of Waltham jarred 16 curculio beetles from 4 trees. This number was obtained from the same trees in 1937 on May 21. On May 11 of last week he obtained only 2 beetles, which reflects a few days of cooler weather. Several heavy infestations of red mite have been observed in early May, another evidence of the early warm weather. In one Worcester County orchard as many as 6 leaf hopper nymphs per leaf were observed on May 11.

A severe case of winter heaving of strawberry plants was observed last week in Auburn. A heavy soil, lightly mulched last fall and a winter of light snow which permitted deep freezing, offers an explanation. Some of the plants can be lifted an inch or two, and an examination of the roots shows much breakage.

The Peat Institute of America has published an interesting leaflet entitled "How to Plant and Grow Trees." The leaflet is well illustrated and shows some rather striking results where peat is used with newly set trees. Some work along this line is being conducted by New York Experiment Station at Geneva.

Two interesting British publications have just been received, "Boron in Agriculture" and "A Review of Developments in the Applications of Boron in Agriculture and Horticulture." The effect of boron on both apples and vegetable crops is discussed. These publications contain a very complete list of references. Any reader of Fruit Notes who is interested in reviewing the field of boron experimentation is invited to send a post card to the writer indicating the particular phase of the subject in which he is interested.

The last issue of "Maine Fruit Notes" prepared by A. K. Gardner and O. L. Wyman of the University of Maine contains a discussion of the following subjects: April 28 is Spray Day, 90% Clean Apple Club (1937), Early Sprays Important for Insect Pest Control, Don't Forget the Borers, and County Field Notes.

An acre inch of water amounts to about 113.4 tons. About 1.8 inches of rain fell in Amherst during the last rainy period. This would go a long way towards supplying an apple crop if all of it were available when the trees need it. The difficulty with a sandy or gravelly soil is its low water holding capacity.

FRUIT NOTES - MAY, 1938

W. H. Thies
Extension Horticulturist

Twilight Meetings

During the month of May, nineteen twilight meetings of fruit growers were held in the orchards of Massachusetts. Twelve of these meetings, attended by the writer, brought out 458 growers. Following is the distribution of meetings by counties: Worcester (5), Essex (4), Middlesex (3), Hampden (3), Hampshire (2), Franklin (1), and Bristol (1). The timeliness and informality of these get-togethers help to account for the good attendance and the continued interest. On several occasions we have noted individual growers who have travelled at least 25 miles to attend. Fifteen similar meetings are scheduled in different parts of the state during June.

A New Slant on the Subject of Organic Matter

From the pen of an old friend, J. B. Abbott, formerly Extension Agronomist at the State College, come these pointed statements about organic matter in the soil.

"If all the accumulated soil-management wisdom of a hundred generations of master farmers were boiled down to just three sentences, one of those sentences certainly would be 'Provide for regular and frequent replenishment of the supply of organic matter in the soil.' Organic matter in the form of humus adds to the water holding capacity of the soil, thus reducing the danger of injury by drought; it serves as a storehouse of readily available plant food, especially nitrogen, and yields it up to the tree with a season-long regularity never achieved by fertilizer alone; it improves the tilth of the soil, making heavy soils more friable and giving sandy soils more body; it increases the permeability of the soil so that rainfall is more quickly absorbed, and run-off and erosion correspondingly decreased; it serves as a culture medium for soil bacteria which render plant foods available. In short, humus is so necessary a part of the soil that no soil is fit for agricultural use unless it contains a good supply.

"The purely physical values of humus presumably would be realized from a static, permanent supply -- if there were such a thing. There isn't. The chemical and biological values are realized only at the expense of oxidizing or "burning-out" humus. Hence the necessity for regular replenishment of the supply, just as the woodpile, coalbin or oil tank require replenishment. That replenishment requires far more organic matter than is generally understood. The New York Stations have found, for example, that few if any cover crops produced after June 15 add to an orchard soil as much humus as is burned out by clean

cultivation up to June 15.

What is to be done about it? Stop cultivation to save humus? Not at all. The humus is there to be used and it pays to use it. Go ahead and cultivate to stimulate chemical and biological activity in order to cash in on the value of the humus, and then re-double your efforts to replenish the supply by broadcast fertilization of cover crops, manuring and mulching."

The Strawberry Situation

Supplies of strawberries for the spring of 1938 are reported to be 14 per cent larger than the small acreage of last year. This, however, is only 1 per cent above the 1927-36 average, according to a report recently issued by E. W. Bell, Extension Economist at the State College. Growing conditions this spring have been very good and yields in the early and second early states were reported to be 25 per cent above average. These large yields are producing heavy supplies without much change in acreage over last year.

Following are a few of the prices quoted by Bell. They indicate the average price per quart at Boston. The source of berries on the Boston Market ranges from Florida to Massachusetts in the following order: Fla., La., N.C., Md., N.J., Conn., Mass. Florida berries sold in 1937 as follows: January, 30¢; February, 29.3; March, 39.6; April, 27.2. The corresponding figures for 1938 are: January, 53.1; February, 27.0; March, 26.0; April, 25.0. The price of New Jersey berries in 1938 ranged from 10.1¢ to 17.8¢. They were marketed between June 11 and June 25. Massachusetts berries ranged in price from 7¢ to 16¢ and the marketing season was from June 11 to July 10.

Notes on Curculio Activity

In spite of an exceptionally warm April, curculio beetles have been somewhat slower in appearing than in the average season. Since May 9, W. D. Whitcomb of Waltham has been jarring four trees on Monday, Wednesday and Friday of each week. The following numbers of beetles have been obtained; prior to May 20, -- 30 beetles; May 20, 36; May 23, 44; May 25, 38; May 27, 17; May 30, 37; June 1, 32; June 3, 33; June 6, 77; June 8, 101; June 10, 113; or a total of 558 up to June 10. This is slightly more than the number obtained on the same trees by this time last year, but the peak of emergence is somewhat later. Ordinarily curculio beetles are present in considerable numbers and are feeding actively around the first of June. Cool weather, or at least no extended hot spell, has delayed feeding, thus complicating the curculio control situation. In many orchards it has been necessary to apply what might be called an emergency spray in order to provide adequate protection. An arsenical application cannot be expected to give protection for more than 10 days. In the average season there is a tendency for curculio beetles to seek out varieties like Duchess, Gravenstein, Baldwin, etc., which size up relatively early. This tends to result in less injury on McIntosh because the apples of that variety are slower in sizing up. A difference along this line may not be apparent in 1938 because all varieties are of a size to attract curculio beetles by the time the majority of them have emerged from winter hibernation.

Some Observations at Beltsville, Maryland

It was the writer's privilege a few days ago to visit the U.S.D.A. Experiment Station at Beltsville, Maryland and observe the interesting work along fruit lines being conducted by J. R. Magness and his associates. A few glimpses are noted below.

(1) Own-rooted trees are being developed by first wrapping a piece of mulching paper about 6 inches in width around the terminal bud and allowing it to remain until August. The bud develops in partial darkness as a result of which root development is stimulated. The paper is attached as growth begins in April. The cutting made at the end of the growing season is placed in the ground and rooting takes place in a large percentage of cases.

(2) A pear variety which is apparently blight resistant. When Keiffer pear trees show about 100% blight this new variety shows about 2%. The quality is reasonably good, being a cross between Bartlett and Keiffer. The blossoms appear to be somewhat more resistant to frost.

(3) A peach orchard on relatively low land freezes out about two years out of three. Another orchard of similar varieties at an elevation 90 feet higher comes through each year with a crop. The temperature in the latter block is often 10 degrees higher. This may mean the difference between minus 2 degrees and minus 12 degrees in the two blocks sometime during the winter. Alternate cultivation or strip cultivation seems to benefit peach trees almost as much as complete cultivation. Very little difference was evident where these two systems of cultivation were practiced.

(4) Mulching of Latham raspberry plants shows a striking difference as compared with clean cultivation. The mulched plants are much larger, more vigorous, and show many more young canes. Under these particular soil conditions mulching is by far the best cultural practice.

(5) In the greenhouse apple trees are being grown in quartz sand for the purpose of studying nitrogen intake during the dormant season. The rate of intake at the different nitrogen levels and at different temperatures will be determined.

(6) A most unusual case of incompatibility is found where Golden Delicious is grafted on Jonathan or on Delicious wherever a particular stock (Spy 227) was used. The grafted variety is apparently causing the death of the entire tree. The reason has not yet been determined.

Apple Conference in Washington, D. C.

About 20 states were represented at a conference called by Director C. W. Warburton on June 6 and 7 to discuss various problems of the apple industry. Following is a brief outline of the program. Abstracts of the more important papers will be presented in early issues of Fruit Notes. If details of a particular talk are desired by any reader of Fruit Notes, correspondence is invited.

Monday, June 6

9:30 a.m. Introduction and Purpose of Conference -
C. W. Warburton, Director of Extension Work.
10:00 a.m. What Is Our Apple Market -
E. W. Braun, General Crops Section, A.A.A.

- 10:30 a.m. Export Situation and Trade Agreements -
A. C. Edwards, Div. of Foreign Agr'l. Service,
B.A.E.
- 11:00 a.m. Production Trends and Long-Time Outlook -
Gustave Burmeister, Division of Statistical and
Historical Research, B.A.E.
- 11:30 a.m. Crop Estimates and Proposed Changes in Methods of
Estimating Commercial Production -
R. Royston, Division of Crop and Livestock
Estimates, B.A.E.
- 1:30 p.m. 1937 Apple Purchase Program -
H. C. Albin, Federal Surplus Commodities Corp.
- 2:00 p.m. Present Federal and State Legislation Pertaining to
Apple Grades and Standardization -
W. A. Sherman, In Charge, Fruit & Veg. Div., B.A.E.
- 2:30 p.m. Possible Further Methods of Regulating Market Supplies
P. R. Taylor, Chief, General Crops Section, A.A.A.
- 3:00 p.m. New Product Uses for Apples -
F. C. Blanck, In Charge, Food Research Division,
Bureau of Chemistry and Soils.
- 3:30 p.m. Discussion.

Tuesday, June 7

- 9:30 a.m. Advertising Programs -
Joseph Anodaca, Division of Statistical and His-
torical Research, B.A.E.
- 10:00 a.m. Certain Production Factors Affecting Marketing -
J. R. Magness, Division of Fruit and Vegetable
Crops & Diseases, Bureau of Plant Industry.
- 10:30 a.m. Apples in the Agricultural Conservation Program -
A. W. Manchester, Director of Northeast Division,
A.A.A.
- 1:30 p.m. Group Discussion Concerning Methods of Meeting Apple
problems. 1. Education, 2. Regulation, 3. By-products,
4. Other methods.

What Becomes of the Apple Crop?

Figures released at the above meeting show the following
average disposition of apples in the United States:

Use	Bu.	%
Consumed on farms	25,000,000	15.6
Domestic, Fresh	80,500,000	51.
Exports	12,800,000	8.2
Canned & Sauce	5,200,000	3.4
Dried	6,800,000	4.3
Other & Wasted	27,700,000	17.5
Total	158,000,000	100.0

Notes From the Cambridge Market

C. F. Dutton, Auctioneer at the Farmers' Regional Produce
Market, reports a total of about 60,000 packages sold through the
auction last season. The final auction was held April 21. Quoting
from a recent letter, "This year, due to the abundance of offerings,
outside buyers have not been on this market, leaving the storage
people stuck without an outlet. The auction has been a home for

a lot of that trade. The large buyers, such as the chains, would, I believe, protect the local crop if it were packed as well as outside shipments. New England growers all pack a different package usually in a second hand box, slack, without covers. A chain store buyer cannot get a volume of uniform packages. They therefore buy a southern basket in order to get uniform carload shipments." Dutton goes on to express his views in these words, "Many growers don't bother to care for their crop, then ship a lot of cider apples to a commission house or auction and ruin the market for the good growers. The cider mill is the greatest help in keeping up the price of good apples, only our friends don't ship half enough to that outlet. With Fancy and U.S. #1 southern fruit selling for 60¢ to \$1.10, what is a spotty, soft, bruised, native, in an old second hand box, really worth? I hope to see a better package and a lighter crop. Then we will have a good year."

The Set of McIntosh

As this is being written numerous reports are being received about the light set of McIntosh. There seems to be little relation between the percent of bloom and the apples now on the tree. The situation in the College orchards is in keeping with the observations of growers and others around the state. What promised to be a 90% percent crop of McIntosh may shrink to a 60% percent crop. One of the most reasonable explanations for the light set in many orchards is unfavorable weather at a critical time. Many growers report plenty of bee activity and more particularly bumble bees. A few striking illustrations of the value of nearly pollenating varieties have been noted. But the whole matter is so complex that a simple explanation for a light set is impossible. The margin of safety between a good set and a poor set is illustrated in individual trees where one branch has a crop and the next one hasn't. Research workers point out at least 8 or 10 factors which govern the set of fruit. Not all of them are under the grower's control. Among the things known to be important are good tree vigor, plenty of nitrogen, an abundance of suitable pollen with insects to carry it, weather sufficiently warm to permit of bee activity, absence of low temperatures, good soil drainage, etc. Some authorities stress the need for good weather conditions at and immediately after pollenation takes place. To sift these various factors and decide which one or ones were responsible for a light set in 1938 may be possible in an individual tree. It is more difficult for the state as a whole.

Items from Here and There

A correction; Holdings of apples in cold storage in the Boston Market Area were misquoted on page 3 of the April issue of Fruit Notes. The figures should have read (1938) 164,990; (1937) 44,693; (1936) 96,056; (1935) 102,119.

According to rumors, "Johnny Appleseed," that legendary character born in Leominster, will once more roam our countryside this coming fall. An Apple Festival Association representing leading groups interested in the fruit industry, is making plans for a real celebration at apple harvest time.

In 1917, California's production of merchantable walnuts was 30,810,000 pounds. In 1937, the pack was 90,500,000, nearly three times that of 1917. During 1917, 16,961,992 pounds of unshelled walnuts were imported, while in 1937 imports amounted to only 263,327 pounds.

More than 1,800,000 pear trees were reported in the State of Washington in 1936. Over 36% of these trees were less than 10 years of age. In comparison, 21% of the apple trees are less than 10 years of age. The Bartlett variety makes up 69% of the pear tree population of the state.

The orange crop of the past year was estimated at 61,004 against 48,617 carloads for the year before. A nationwide marketing drive is on. The drive is being handled by the California Fruit Growers Exchange. Investments in citrus properties in California total \$637,648,000. Annual sales of citrus fruits from the state often exceed \$100,000,000.

Excessive amounts of potash fertilizer on soils low in calcium may be conducive to calcium deficiency and poor growth of the trees. On the other hand, large amounts of lime on soils low in potash will result in potash deficiency, so there is a need for balanced feeding of fruit trees, according to O. W. Davidson of the New Jersey Agricultural Experiment Station.

A dairy cow drinks about 11½ tons of water a year, an average of 8 gallons a day. No one would think of allowing a dairy cow to stand in water up to her knees one week and go without water entirely the next. Yet that is about the situation in some of the fruit plantings of New England. A variable water supply has much to do with regular production of good quality fruit.

A buyer was told to watch the market and, after a few days, wired his company to this effect: "Some think it will go up and some think it will go down. I do, too. Whatever you do will be wrong. Act at once." This buyer was apparently guessing. There is no guesswork about the value of thinning apples. Time spent in getting rid of blemished fruits and in increasing the size and quality of the ones that remain, will be time well spent.

"Bees for the Beginner" is the title of Extension Leaflet 148, recently revised by F. R. Shaw of the State College. A copy of this bulletin may be obtained on request.

The Federal Surplus Commodities Corporation was responsible for diverting about 4% of the total commercial apple crop during the 1937 season. Purchases of fresh apples by this Federal agency to be used for welfare purposes included fruit from 27 different states. New York State was highest in number of bushels sold under the Federal Program with 1,070,478. Virginia was second with 823,219, and Washington third with 773,528. 73,958 bushels were purchased in Massachusetts.

The planting of currants and gooseberries is prohibited in 210 cities and towns in Massachusetts. This regulation was approved February 27, 1930. This restriction in the planting of these fruits is aimed at a prevention in the further spread of White Pine Blister Rust.

FRUIT NOTES - JUNE, 1938

W. H. Thies
Extension Horticulturist

Farm and Home Week Program for Fruit Growers, M. S. C.
Amherst, July 26 and 27. (Under pines near Fisher Laboratory)
Tuesday, July 26, John E. Rice, Marlboro, Presiding
9:00 Machinery Demonstrations.

Here is an opportunity to see in operation the latest developments in sprayers, tractors, orchard cultivators, and harvesting equipment. Whether or not you are in the market for machinery, it is interesting and worth while to follow developments in this field.

10:30 What Makes a Good Orchard? W. H. Thies, M. S. C.

What is the difference between a 500 bushel per acre orchard and a 200 bushel block, and what can be done about it? An old problem will be viewed from a new angle. How does your own orchard measure up?

11:00 Soil Improvement with Special Reference to Orchards. A. B. Beaumont, Amherst.

How may an ordinary orchard soil be made better? This is a live problem with almost every fruit grower and Dr. Beaumont brings to it the knowledge and skill born of long years of study and experience in this field

12:15 Luncheon at the College Cafeteria

2:00 The McIntosh Drop. Lawrence Southwick, M. S. C.

Here is one of the toughest problems facing the McIntosh grower. Mr. Southwick has been studying the preharvest drop for several years and has discovered some interesting things about it.

2:20 Round Table on Current Problems. R. A. Van Meter, M. S. C.

Here is a chance to discuss the problem that is bothering you right now. Each year brings new problems and new slants on old ones. Match your experiences with those of other fruit growers.

3:00 Some Observations on Apple Growing in Maine. R. H. Lovejoy, Sanford, Maine.

Mr. Lovejoy is County Agricultural Agent and the capable manager of a large apple orchard. He knows Maine and what Maine apple growers are thinking and doing.

3:45 Orchard and Nursery Tour.

How do the new clonal roots affect McIntosh apples? How are the new spraying materials showing up in trial plots? See the budding and grafting demonstrations and many other things of interest.

Wednesday, July 27

9:00 Machinery Demonstrations

10:00 Late Summer Spraying. O. C. Boyd, W. H. Thies, A. I. Bourne, M. S. C.

What is the pest situation at the present time in Massachusetts? These men have been in close touch with developments through the season and have some valuable information for every fruit grower.

11:00 Marketing Fruit in the Northeastern States. L. A. Bevan, New Brunswick, N. J.

An outstanding problem of the industry discussed by one who has studied it for years, first in Massachusetts, then in New Jersey. Mr. Bevan will have some interesting and illuminating observations on the market situation.

12:15 Luncheon at the College Cafeteria.

2:00 Storage of Apples in Commercial Storage. George W. Boutillier, Providence, R. I.

As a manager of a large cold storage plant Mr. Boutillier has gathered a wealth of interesting information on the storage of apples in city storage.

2:30 Storage of Apples in Farm Storage. W. R. Cole and O. C. Roberts, M.S.C.

Farm storage is of direct interest to almost every fruit grower in Massachusetts. These men have studied the storage problem under widely varying conditions and probably can help with the problem that bothers you.

3:00 The Apple Crop in Massachusetts and the United States. W. E. Piper, State Department of Agriculture.

How many apples shall we have to market this winter? What is the condition of the crop? What promise is there in the export market? Mr. Piper is in close touch with crop conditions all over the country.

2:30 Plans for the Apple Institute Advertising Campaign. John Chandler, Sterling Junction.

The Apple Institute is a part of the biggest and most carefully developed advertising campaign ever undertaken in the East. Its continuing success depends upon you. This is a report on progress and plans by a man who has helped the Institute from the start.

Plans for the Harvest Festival. Fred E. Cole, Worcester.

Here is something new in efforts to further popularize the apple. If it can be developed successfully, the festival will contribute further toward a better marketing situation. You will want to know about it.

Production Factors Affecting Marketing

At the recent apple conference in Washington, J. R. Magness said that much of the surplus in heavy crop years comes from orchards east of the Mississippi where the average grower has less control over production factors than in the Northwest. In the latter section the annual production since 1931 has not exceeded 55 million bushels and has not been lower than 47 million bushels. Over the same period, the crop in the East has varied from year to year by more than 100%. In the Northwest orchards are planted on good land, the moisture supply is controlled by irrigation, trees are maintained in good vigor, there is less frost hazard in spring, and an abundance of sunshine keeps the foliage working efficiently. All of these factors tend to produce good annual yields. Low temperatures in recent years in New England have thrown many of our McIntosh trees into biennial bearing.

The use of lime sulfur in New England injures our early foliage and thereby effects fruit bud formation. Fruit buds are normally formed within 60 to 75 days after bloom. In the West a fungicide is not needed in early spring and the early foliage in that section is much better as a result. Uniformly high light intensity increases production by letting the foliage function over a longer period. During a cloudy day the efficiency of the leaf may be cut 50 per cent. If we have an abundance of sunshine and a shortage of moisture during the period of fruit bud formation, there is a tendency for a heavier bloom the following spring. Trees in the Northwest are able to carry a heavy crop and still form fruit buds for the next year. Two examples will help to illustrate the relation between a dry summer and the crop the succeeding year. Dry summers were recorded in the East in 1930 and 1936. Our apple crops during those seasons were 99 million and 69 million bushels, respectively. The two following years, 1931 and 1937, our apple crops were 148 million and 153 million bushels, respectively. The natural hazards in orchards in the East may not be easy to overcome. The owner of a poorly located orchard is usually helpless when a frost or a drought occurs. Border line orchards tend to produce a crop when everybody else has a crop. Production is much easier to control in a frost free location.

Heavy thinning is practiced in the Northwest. In the East, drastic treatment in the way of thinning would be necessary to bring into annual bearing an orchard which has acquired the biennial habit. Extremely heavy and extremely early thinning completed within 30 days of full bloom will tend to do the trick. But the fruit would have to be thinned to at least two feet apart thus reducing the amount of fruit to not more than 25% of the original and allowing about 100 leaves per fruit. McIntosh, Yellow Transparent, and Rome Beauty seem easier to influence if the tree is in good vigor. Such an influence is, of course, feasible only in a frost free location.

Irrigation and thinning together reduce regular bearing to a greater extent than either practice alone. This is to be expected since a dry summer tends to stimulate more fruit buds. Experiments are now being performed with toxic sprays applied during bloom to eliminate the crop entirely from certain trees. In an experimental test, one of the tar distillate sprays eliminated 99% of the prospective set without preventing a crop the next year. There is apparently no hope of destroying just enough of the blossoms to bring about annual bearing.

Many of our cull apples are in that class because of small size. And small size is often due to a lack of thinning. We fail to get good finish or color in big crop years. But it is difficult to do an effective job of spraying or thinning on trees 30 to 40 feet high. We should keep our orchards young by eliminating older trees and by replanting. The McIntosh of New England and the Hudson Valley have made their reputation on the product of young trees.

Items from Here and There

County agricultural agents from Massachusetts along with several other members of the College staff toured southern Vermont and New Hampshire on June 30 and July 1 and 2. The tour ended at the University of New Hampshire in Durham, where pasture fertilizer plots, barns, poultry plants, etc., were looked over. Two good orchards were visited on the trip, those of W. H. Darrow, Putney, Vermont, and Robert Gould of Hopkinton, New Hampshire. A striking example of a potash response in grass plots observed at Claremont, has a direct application to orchard cover crops on certain soil types.

The writer spent an interesting day recently visiting a series of 6 low bush blueberry fertilizer plots in Granville and Blandford. Five nitrogenous fertilizers were used in each experiment as follows: Nitrate of soda, sulfate of ammonia, cyanamid, cottonseed meal, and a complete fertilizer. Thus far the results are not at all convincing, although there is plenty of evidence of a stimulated weed growth where a more readily available nitrogen is used. All of the fertilizer plots also show some improvement in growth of blueberry plants, with cottonseed meal giving the least response. If growers of low bush blueberries ever adopt a fertilizer program, it looks as though they would also have to fight competing vegetation..

The number of adult leaf hoppers of the first brood present in some orchards in late June gives us an inkling of what we may expect in late August when the second brood comes on. A thorough contact spray about September 1 is strongly recommended wherever leaf hopper nymphs are found to be numerous. An application at that time will probably do more good in controlling leaf hopper than any other application during the season.

A shortage of information on the subject of quinces is partially met by a new publication, U. S. D. A. Leaflet No. 158, "Quince Growing", written by H. P. Gould, Senior Pomologist of the U. S. D. A. This leaflet covers briefly the following subjects: habit of growth, soils, trees for planting, care of trees, pruning, diseases, insects, and varieties.

The June issue of the American Fruit Grower includes a complete summary of fruit growers' supplies with classified index and names of dealers supplying everything from acetylene torches to zinc sulfate. This Buyers' Guide for the Fruit Farm is a useful addition to the fruit growers' library.

A speaker on the recent Apple Conference Program in Washington made this striking statement about apple marketing. "Apple prices become unduly low when a volume approaching 90 million bushels is marketed in the regular fresh channels in the domestic market. Returns to growers approach more closely what is considered a satisfactory price when marketing in the domestic fresh fruit market approximates 70 million bushels. When prices are adjusted in a manner to correct

for difference in demand conditions, 70 million bushels in the commercial market have a greater value than 90 million bushels."

W. A. Sherman, in charge of the Fruit and Vegetable Division of the Bureau of Agricultural Economics, says that more laws have been passed in the United States with reference to apples than to any other fruit or vegetable. 14 different states have enacted laws affecting apples only. U. S. Grades for apples have done much to bring about a standardization of fruit shipped in interstate commerce, and the grower who today throws out a few culls and then labels the remainder No. 1 and No. 2, is almost sure to get into difficulty if he ships interstate commerce.

In February, 1895, according to Samuel Fraser, 11 cider and vinegar men met at the Sherman Hotel in Chicago to decide what was to be done about apple grades. As a result of this meeting, the International Apple Shippers' Association, a non-profit cooperative organization was established.

The first public advertising of a food product is reported from England about 300 years ago. The product was coffee. And the glowing phrases used to describe its deliciousness and its beneficial objects would lead the reader to believe that he had at last found the Fountain of Youth.

In June, 1937 issue of Fruit Notes, reference was made to the heavy rainfall for that month, 5.72 inches. We commented at that time on "A Rainy June and Its Effects in the Orchard". In 1938 the month of June brought 8.45 inches of rainfall in Amherst which is more than twice the normal, 3.54 inches. Thus far the season has been very favorable for orchards on droughty soils. But it has been equally unfavorable for orchards on water logged soils. Other effects include rapid sizing of the fruit and an abundance of scab infection in poorly sprayed orchards.

A bibliography of 122 references on the vitamin content of apples, use of apples for medicinal purposes, and other studies on apples as food are contained in Popular Bulletin 152, "The Nutritive Value of Apples", published by the State College of Washington, Pullman, Washington. This bulletin contains information on the composition of apples, vitamin content of different varieties, therapeutic uses of apples, etc. The statement is made that two apples of the Winesap Rome Beauty or Spitzenburg variety eaten daily will protect a man from scurvy, while five apples of the Delicious variety and six of Jonathan are required.

In a recent issue of the Canadian Journal of Research, H. P. Bell offers this explanation of the origin of russeting in the Golden Russet apple. "About the time of full bloom many epidermal cells divide by a tangential wall. Later in June some of the epidermal cells divide again in the same way forming a layer varying from two to four cells thick. Early in July a cambium is initiated in the innermost cells of epidermal origin. This cambium is very active and immediately gives off cells which differentiate into cork. Non-russeted portions of the apple may have a very thick convoluted cuticle."

As an aid in identifying varieties of tree fruits and as a permanent record of variety characteristics, the U. S. D. A. in Washington, D. C., maintains a file of several thousand natural color paintings and a similar number of

wax models. Several artists devote their entire time to this piece of work. So life-like are the wax models that the original specimens have been duplicated even to the fuzz on peaches and the bloom on plums. The russeting of pears is especially realistic.

Although the fair season is still a couple of months away, it is not too early to prepare for fair exhibits. Thinning of tree fruits to develop good size and color is one important item. Even grape clusters may be greatly improved by proper thinning. Furthermore, it is always easier to select an assortment of good specimens on the tree or vine than to depend on handling over the harvested crop the night before the exhibit is set up.

W. T. Pettey, fruit and poultry specialist in Bristol County since 1934, is leaving the Extension Service July 1 to devote his attention to his farm in Holliston. Previous to entering the extension field Mr. Pettey was for a number of years instructor in fruit growing at the Bristol County Agricultural School.

A recent survey of beach plum pests on Cape Cod reveals the fact that a disease, plum pockets or plum bladders, is causing much damage and in many cases is responsible for a crop failure. Apparently, this is the worst disease of beach plums in Massachusetts. An insect, the plum gouger, was also found attacking the fruit while the following leaf eaters were observed: tent caterpillar, gypsy moth, pistol case bearer, leaf roller, and others. It appears that growers of beach plums will have to adopt a spray schedule if satisfactory crops of fruit are to be harvested in the future.

New Product Uses for Apples

From the Food Research Division of the Bureau of Chemistry and Soils in Washington, come these interesting facts about new apple products. When we consider the imposing list, we realize the vast amount of time, experimental study, and inventive skill devoted by Federal and state workers in their development. Products now being manufactured include vinegar, cider, brandy, dried apples, apple jelly, canned apples and apple sauce, apple butter, pectin, frozen apples, carbonated apple juice, dried apple pomace, brined and sulphured fresh slices for the bakery trade, apple concentrate, apple syrup, apple powder, apple specialties (confections), the waxy coating, and apple seed oil. About 6,000,000 bushels or 3.6% of the total crop are used annually for the various juice products alone, and in 1935 dried apple exports amounted to about 5,000,000 bushels.

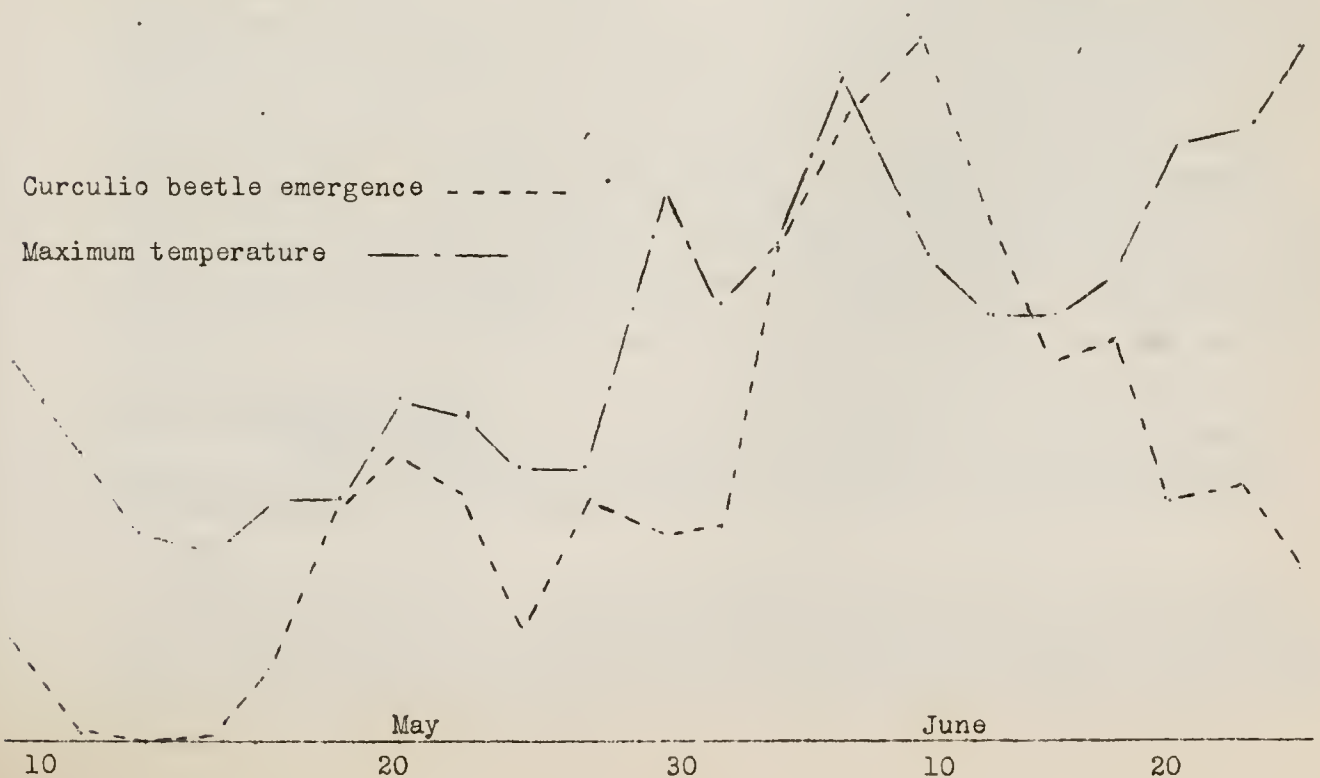
Apple juice was first concentrated in the form of boiled cider but it was never sufficiently palatable for average purposes. Next came low temperature evaporation in a vacuum pan, finally perfected by adding back the volatile ester and other volatile flavoring constituents. The most recent improvement in a vacuum concentrator developed at the Fruit and Vegetable By-products Laboratory involves a combination of freezing to remove water and a rapid vacuum evaporation with volatiles added back. Concentration in this way to 72% solids gives a product that does not require any preservative nor sterilization. Samples have been held in the laboratory at room temperature, unsealed for three years with no evidence of microbial contamination and no deterioration in flavor. And now the use of pectin has been suggested as a "sticker" in insecticidal sprays. This would surely complete the cycle, -- pectin from cull apples, used in a spray to prevent culls in succeeding crop years.

Notes on Plum Curculio and Apple Maggot

The season of 1938 was most unusual in its relation to the activity of the plum curculio. For three weeks after the first beetles were collected on May 9 the maximum temperature exceeded 75° only on May 24. High temperatures which stimulated curculio activity did not occur until June 5 to 12, and even then the period was interrupted by two days in the 60's with generally cool nights. This critical period of curculio activity which normally occurs about 10 days after the calyx spray is applied was about three weeks later in 1938. Although the beetles were slow in appearing, the total number collected exceeded that in 1937 and 1936. Due to the delayed activity of the curculio, nearly all trees were sprayed before they were attacked and in spite of the abundance of beetles the damage to apples is generally less than usual.

The first apple maggot fly emerged in cages at Waltham June 22. In 1934 the first fly was also found on June 22. The average date is June 28. This indicates that the flies will be present early in July and sprays for their control should be applied at the recommended dates. It is not believed that the maggot will be abundant this season but it seems to be a year of surprises and anything can happen.

(W. D. Whitcomb)



W. H. Thies
Extension Horticulturist

The "X Disease" in Massachusetts

A disease of peach trees which has been observed in Connecticut for a number of years is now definitely known to be present in Massachusetts. A visit was made to four peach orchards on August 2 with E. M. Stoddard and his associates Odell and Fitzpatrick of the Connecticut Agricultural Experiment Station, and J. S. Bailey of the State College staff. These orchards are located in Hampden, Worcester and Middlesex Counties. In three of the four orchards "sick" trees were found to be affected with the so-called "X Disease." The fourth orchard showed partial defoliation due to Bacterial Leaf Spot, a fairly common ailment in Massachusetts.

According to investigators, the "X Disease" is always associated with diseased choke cherries, a plant of very common occurrence in New England. In the choke cherry the disease manifests itself in foliage of abnormal color, in some cases a brilliant autumn red with tufts of greenish leaves at the tips of the branches. Wherever such plants are found growing adjacent to a peach orchard there is reason to suspect infected peach trees. This was the case in each of the three orchards mentioned above. A study of conditions in the State College orchard in Amherst reveals a similar situation. Certain peach trees show unmistakable symptoms of the "X Disease."

Briefly, the above disease is characterized by abnormally colored areas in some of the leaves which later drop out leaving a ragged appearance. Such leaves often curl somewhat toward the mid-rib and later fall from the tree. It is not uncommon for a tree to show only an occasional branch with these symptoms. The removal of such branches, however, does not eliminate the difficulty since it tends to spread throughout the tree like other virus diseases, such as Peach Yellows. Thus there appears to be no cure after a tree becomes infected. Elimination of all choke cherry bushes in the vicinity in advance of planting is recommended. Spraying of the choke cherry foliage with one of the recommended weed killers is recommended. Incidentally, the "X Disease" does not kill the peach tree outright. In fact, a diseased tree will live for years, and leaf out each spring in a normal manner. But few fruits will develop on diseased branches and those which do develop will be of poor quality. It appears now that many of the peach trees in Massachusetts which have heretofore appeared abnormal for reasons attributed to soil, Peach Yellows, etc., have been affected by this new disease now being studied in Connecticut. We suggest that growers be on the lookout for abnormal peach trees and for diseased choke cherries. The further spread of "X Disease" and the infection of new plantings may be prevented by taking a few precautions.

Cold Storage Facilities

Perhaps it will interest readers of Fruit Notes to know just how much cold storage capacity is available to them and to other New England and Massachusetts apple growers.

The cities of New England have cold storage facilities for a total of 3,690,740 bushels of apples. Of this amount 3,151,240 bushels are in Massachusetts. There are 95 country point cold storage warehouses in New England with a total capacity of 2,032,550 bushels. Of these, Massachusetts has 38 storages with a capacity of 1,067,300 bushels. Omitting from the totals, three large custom-type cold storage warehouses holding 500,000 bushels, the 35 remaining are "farm" storages which hold 567,300 bushels, or an average of 16,200 bushels per storage.

It is interesting to note that Connecticut has 35 such storages with a total capacity of 516,000 bushels or an average of 14,750 bushels per storage.

W. R. Cole

Apple Conference Recommendations

Out of the apple conference held in Washington, D. C., June 6 and 7, have come the following recommendations of interest to the apple industry.

1. A committee should be formed of representatives from each of the Bureaus of the Department of Agriculture, whose work is connected with the apple and fruit industry. This committee would have the following functions:
 - a. Correlate the work of the various divisions of the Department pertaining to the apple industry.
 - b. Indicate how the work of each division can best fit into a unified research and educational program.
 - c. Furnish educational material to State extension and other educational agencies.
 - d. Assist the apple industry and State educational agencies in developing programs designed to remedy problems confronting the industry.
2. Each State Extension Service should designate at least one representative to work closely with the Departmental Committee in the development of industry programs and use of research material.
3. Research activities in the States pertaining to problems of the apple industry should be stimulated and correlated through the Departmental Committee.
4. Outlook work pertaining to the 1938-39 apple marketing season should be started in advance of the season, preferably in August and September.
 - a. The assistance of the Bureau of Agricultural Economics, Marketing Division of the A.A.A., and Extension Service is requested in developing this program.
5. Further consideration should be given to the problem of eliminating cull and low-grade fruit from markets, particularly in years of large crops.
 - a. Additional research is needed to determine the effect of such restrictions upon the income of growers in various producing areas.
6. Research relative to present and new by-product uses of apples and improvements in methods of production should be continued.
7. Further improvement of statistics relating to production, utilization, and distribution of the apple crop should be made.

8. The problem of removal of uneconomical apple orchards and varieties should be given additional attention in relation to the Agricultural Conservation Program and, if necessary, a separate program for this purpose should be considered.

a. Further consideration should be directed at securing the most advantageous use of funds expended by the A.A.A. and other agencies from the standpoint of the long-time welfare of the apple industry.

Paper From Prunings

A method for making fine grades of paper from fruit tree prunings has been developed by three Toronto scientists. Tests have shown the paper to be of very superior quality and plans include the production of book, coated, magazine, bible, and air mail papers. Surveys in four intensive fruit sections of Canada and the United States indicate 2,000,000 tons of pruning wood available each year, which will make 600,000 tons of pulp. Prunings will be baled and shipped to the nearest mill. Sounds like bunk but we may hear from it again.

R. A. Van Meter

Radio Programs for Farmers and Homemakers

Timely information of interest to farmers and homemakers may be heard on the following radio stations:

Monday through Friday at 6:15 a.m. over WBZ and WBZA.

Monday through Saturday at 12:15 p.m. over WAAB, Boston; WSPR, Springfield; WHAI, Greenfield; WEAN, Providence, Rhode Island; WICC, Bridgeport, Connecticut; WLNH, Laconia, New Hampshire.

Monday, Wednesday, and Friday at various times over WHDH, WMEX, WORL, and WOOP, Boston; WLAW, Lawrence; WSAR, Fall River, WMAS and WSPR, Springfield.

Other radio programs are conducted by county extension workers in Essex, Bristol, Worcester, Franklin, Hampden, and Berkshire counties. Consult your local papers for these programs.

G. O. Oleson

Late Season Pest Control

Although the 1938 spraying season is practically over, there are still a few things which should be considered in connection with orchard pest control. Five apple pests, two diseases and three insects are likely to remind us of their presence here and there in Massachusetts. The two diseases, apple scab and sooty fungus, will of course be much less in evidence where the early season program was properly applied. But the task is not completed by mid-summer. O. C. Boyd in a recent issue of Crop Disease Notes says, "Despite repeated statements to the contrary, apple scab control, even where primary infection was successfully prevented through the calyx spray, should not be considered a task finished in or during the early cover sprays. If there is any scab at all on leaves or fruit, particularly in the uppermost branches, at the end of June, then the usual sulfur fungicide in the third and fourth cover sprays is bound to be needed to protect the rapidly enlarging fruits against secondary infection. Furthermore, even though scab appears to be practically absent, the late July or early August spray or dust (timed for the apple maggot) on scab-susceptible varieties should contain sulfur. This is the last chance to cover the apples, and this coating of sulfur must be relied upon to protect the fruit until harvest."

In a number of orchards the color of foliage indicates a heavy infestation of red mite. In most of these orchards no oil spray was applied last spring. Recent rains have probably reduced the red mite infestation considerably. Were it not for the likelihood of increased spray residue we would probably recommend an application of Summer Oil for this pest. Furthermore, an oil at this season may cause some foliage injury on trees having a considerable residue of sulfur. Oils of this kind are the only known spray material which will effectively kill the eggs of red mite. But as previously suggested there are reasons for not including such materials in the spray schedule. According to W. D. Whitcomb, some fruit growers who do not wish to use a summer oil have sprayed with potash fish oil soap using 1 gallon to $1\frac{1}{2}$ gallons in 100 gallons of spray. This soap does not kill the eggs but has reduced the mite population very satisfactorily. Applications of soap may necessarily be repeated to prevent a recurrence of mite injury but it has been very satisfactory in giving at least temporary relief.

Leaf hopper promises to be a troublesome pest in many orchards before harvest time. There is reason to believe that a thorough application of nicotine sulphate, 1 pint, plus 2 lbs. of soap in 100 gallons around the first of September will prove an excellent investment where leaf hopper is troublesome. But a reminder is in order that the leaf hopper nymphs must be hit by the spray material. This implies a different technique from that used in many orchards. We must spray from underneath, and that is not so easy in a tree weighted down by a heavy load of fruit. Spraying from the tank for leaf hopper is very largely a waste of time.

A third apple insect which is still a menace here and there is the apple maggot or railroad worm. It is now too late to apply liquid sprays for this insect except possibly on the very latest varieties of winter apples. We prefer to recommend dust applications instead of sprays during August and then only on the later varieties. But there is another item of orchard management which is always effective and that is the gathering up and destroying of all maggot infested fruit. It is, of course, ineffective unless done regularly beginning as soon as infested apples fall to the ground. Such drops should be picked up at least once a week, particularly in the case of summer and fall varieties. Twice a week is still better.

A Study of Production and Marketing in Delaware

In a recent study of the "Retail Marketing of Apples by a Chain Store Warehouse in Philadelphia" (Bulletin No. 208) by H. S. Gabriel of the Del. Agr. Exp. Sta., the following recommendations are made: "Since apples must meet such keen competition, it is necessary that demands of warehouses be adequately met. Their chief requirements are three in number: (1) that apples be free from blemishes, (2) that their size be adequate (diameter of at least two and a half inches for fall and winter apples), and (3) that they be highly colored.

In order to produce apples which meet these requirements, the following horticultural and marketing practices are suggested: (1) Select for marketing purposes three or four of the best selling varieties. (2) Give each tree in the orchard adequate space, thus insuring size and color. (3) Properly fertilize the orchard to improve vigor of trees, which results in increased size of fruit. (4) Practice proper pruning methods to increase light and therefore the color of fruits, and remove undesirable bearing wood; that is, weak branches which bear small fruits. (5) Induce proper pollination by the correct choice of varieties and by the introduction of bees into

the orchard to distribute the pollen. This will tend to insure fruits symmetrical in form and full in size. (6) Thin the apples on the tree to produce better sizes and grades. (7) Properly spray the trees to eliminate diseases and insect pests, thereby improving color and grade of the apples. (8) Grade rigidly to conform to official standards. (9) Pack carefully in order to avoid bruising.

Two Rainy Months

According to a report by C. I. Gunness of the College staff, 8.45 inches of rain fell in Amherst during the month of June. The normal for that month is 3.54 inches. That looked like a tremendous amount of rain for a single month. But the month of July "added insult to injury" by bringing us 7.45 inches of rainfall, while the ~~normal~~ for July is 4.33 inches. Thus we have a total rainfall for the two months amounting to 15.9 inches compared to a normal rainfall of 7.87 inches. This is more than twice the amount normally expected. And it is ~~said~~ that the rainfall in eastern Massachusetts was even more excessive.

The effects of so much rainfall are quite apparent. Grass has grown exceptionally well on the drier soils where water is generally a limiting factor. Dairy men have found it very difficult to cure hay. The result is a large tonnage of spoiled hay which will serve as excellent mulch for a grower on the lookout for such material. Thousands of tons should be moved into needy orchards. This is one of the best examples of using a practically worthless material in a year of surplus to supply a real need in the orchard. Fewer hours of sunshine and excessive water in the soil have combined to provide unfavorable growing conditions for some fruit crops. Water logged soils are in evidence where normally soil might be considered fairly well drained. The writer recalls a recent orchard visit where care was necessary to avoid stepping in over one's shoetops. It is reasonable to assume that fruit trees are not too happy under such growing conditions. A season like this offers a real chance to form an estimate of a given orchard location from the standpoint of drainage and water holding capacity. It takes a good soil to come through a very wet season as well as a very dry season in good condition. Good soil drainage and good water holding capacity seem to be the critical factors involved.

Of all the fruit crops, raspberries probably suffered more than any of the others from excessive rainfall. A large percentage of the berries either molded or dropped off while many of the harvested berries were watery and therefore of poor quality. The weather man apparently planned his affairs without much regard for the raspberry crop.

Apple Crop Prospects

About the middle of July, 100 cards were sent out to Massachusetts apple growers asking for an estimate of the present season's apple crop and a report on the amount harvested last fall. Fifty-two growers replied. Following is a summary of these reports

	Bu. Harvested (1937)	Bu. Estimated (1938)	Increase or Decrease
McIntosh	204,109	207,950	+ 2%
Baldwin	67,481	84,200	+ 25%
Other	114,828	100,025	-13%
Total	386,418	392,175	+ 2%

At a recent Farm and Home Week meeting of fruit growers, W. E. Piper of the Division of Markets, reported on apple crop conditions over the country. He anticipates "a national crop about one-third less than last year. The principal decrease is in the states east of the Mississippi. The central western area will have a crop about 75% less than last year. The Virginia crop will be reduced about 50%. New York and New England have about one-third less than last year. In the far west they will have fully as many as last year and possibly a few more.

Stray Thoughts

Hordes of gullies now remind us
We should build our lands to stay,
And, departing, leave behind us
Fields that have not washed away;
When our boys assume the mortgage
On the land that's had our toil,
They'll not have to ask the question
"Here's the farm, but WHERE'S the SOIL?"

"What are the ten most important trees in the world?" Here is the answer of H. E. Clepper of the Society of American Foresters: date palm, coconut palm, almond, apple, fig, mulberry, olive, lemon, cinchona, rubber. (It is interesting to note that he includes the apple but omits the orange and the banana. What's your choice?)

The Boston Regional Produce Market opened its fourth season on May 9, 1938. During May 1938, the number of packages handled was 50% greater than in May 1937; and in June 1938, the volume of produce was 74% larger than in the corresponding month of 1937. The auction for the sale of fruits and vegetables is conducted on Monday, Thursday, and Friday of each week at 4 P.M. The first auction was conducted on Thursday, July 14.

A new type of peach tree bearing reddish colored leaves promises to benefit the nurseryman and the peach grower. Using this tree as a stock upon which to bud the desired variety, it is a simple matter to go along the nursery row next season and detect by the color of the top the buds which failed to take. If this stock proves satisfactory it should result in fewer misnamed trees.

W. D. Whitcomb reports a "peak" in the emergence of apple maggot flies around July 12 with a somewhat smaller number of flies emerging from day to day during the rest of the month. His record of emergence this year is in line with the recommended spray schedule which advises an application around July 10 followed by a second application around July 25.

This is the season of good intentions in the matter of placing strawberry runners. New plants are developing very rapidly which will mean a matted row in the near future unless prompt steps are taken to space them as suggested for strong growing varieties like Catskill, Dorset and Fairfax. Yields are likely to be disappointing unless plants are given plenty of space. Other varieties such as Howard 17 fare much better than these heavy feeding varieties if allowed to grow in a matted row.

FRUIT NOTES - August, 1938

W. H. Thies
Extension Horticulturist

Fall Dormant Spray Best for Leaf Curl Control

This does not mean that the spray applied in the fall would be more toxic against the peach leaf curl fungus than the same mixture applied in the spring. Nevertheless, the fall spray is likely to yield better control of the disease for the following reasons: (1) Because of the generally uncertain weather and soil conditions in the spring, the spray is likely to be omitted entirely or so delayed that it is not effective. (2) In addition, weather conditions, particularly regarding the wind, are generally more conducive to the operator's doing a better job of covering the trees thoroughly in the fall than in the spring. And every inch of surface of the branches must be covered because the leaf curl spores winter over on all such parts of the tree top. Even in the case of small trees and a large spray outfit each tree should be sprayed from both sides to insure complete coverage.

The kind of material to use is "cut and dried" for our conditions (see printed spray chart): Bordeaux 8-8-100 (plus winter strength of oil if scale or red mite is present), or liquid lime-sulfur 7 gals., or 18 lbs. of the dry form to 100 gals. water. The fall dormant spray may be applied any time after the leaves have dropped.

O. C. Boyd

Some Harvest Season Puzzles

The McIntosh harvest season has brought to light several questions which seem to be in the mind of the average grower. (1) Shall I pick the tree clean or shall I pick for color (spot picking)? (2) Does it pay to leave the apples stand under the trees for a day or two in order to get better color? (3) How good should an apple be to justify storage? The writer is not going to attempt definite answers to these questions. The answers will vary with the individual and his market. In general, spot picking results in much better average color because the greenish-colored fruit left on the tree for a second or third picking is certain to take on added color. Such fruits also have a tendency to hang to the tree somewhat better after a portion of the crop has been harvested.. The answer to the second question is definitely No if one is interested in storing the crop until late winter or early spring. The third question may be answered like this: A poor apple generally gets worse in storage.

McIntosh Drop

The writer would appreciate growers' reactions to the problem of McIntosh drop. If any grower has an orchard in which

certain trees drop their fruit worse than others year after year, or other trees which hold their fruit unusually well, a postcard giving such information, will be of interest to the writer.

L. Southwick

Concentration Stations for Mouse Control

Field agents of the Biological Survey have observed heavy infestations of mice in orchards this fall, and are recommending early placement of concentration stations in preparation for poison operations. This procedure involves the placing of small hay or mulch piles beneath each tree at least one month before control work begins. If mice are present, they will build trails beneath the hay; and the task of locating trails for bait placement is greatly simplified. Concentration stations need not be over three feet in diameter and a foot thick. They should be placed in grassy areas, preferably in rough spots. One station per tree is generally sufficient.

Demonstrations will again be given in all counties of the state starting the last of September, and orchardists may obtain the rodenticide at these meetings. Notices of dates and locations of the demonstrations will be sent to fruit growers within the next few weeks.

Immature Apples (A Borrowed Editorial)

Last season the Wealthy deal, and later, the McIntosh deal, was seriously retarded by the picking, selling and retailing of unripe, greenish, poor-flavored apples. The weather was responsible for much of the poor-color Wealthies. This was not the case with McIntosh. Ideal weather resulted in one of the best colored crops when McIntosh were left to grow and mature properly. Both growers and distributors were responsible for this calamity. Consumers clamored for McIntosh in the markets, clerks demanded McIntosh of their buyers and buyers worried the growers for them. Growers, anxious to get started, escape dropping, and get ahead of the rush, picked and sold apples that they could not have eaten themselves. RESULT: Thousands of retail stores stocked with unlovely, astringent, disappointing McIntosh which so disillusioned the consumers as to the goodness of McIntosh that they turned to the fine assortment of other seasonal fruits. Countless stores worried over their supplies of unwanted McIntosh before they got rid of them and made new purchases of mature apples. This must not happen again! Buyers take warning! There is loss, not profit in green McIntosh. Growers beware of the lure of early sales of immature McIntosh! We do not have state control which prohibits the sale of unready citrus fruit. It is up to our intelligence and consciences to protect the McIntosh and ourselves from picking too early. (August Bul. N. Y. & N.E. Apple Institute)

Items from Here and There

Deer Damage. "Protecting Orchard Trees from Deer" is the title of a new mimeographed leaflet prepared by E. M. Mills, Division of Predator and Rodent Control, Amherst, Mass. This leaflet summarizes the present status of repellent devices and substances, including sprays, "deer-proof" fences, tar-paper cones, electric fences, etc. A copy may be had on request.

Farm Analysis. R. E. Moser, Extension Economist at the State College has recently published a Farm Management Survey covering the town of Ashfield, Franklin County. In the 16 farms studied, the labor income varied from \$2313 to \$1140. Thirty percent of the crop area on these farms is used for growing apples, averaging about 24 acres per farm. Factors affecting profits are analyzed. It appears that the per acre yield is important, since the average for all of the farms is reported as only 82.5 bushels per acre. Grass was removed for hay from about 50% of the total orchard area instead of leaving it as a mulch.

Mold Spores. Steam Sterilization of Apple Boxes for Blue Mold is discussed in Bul. No. 357, by Wellman and Heald of the Wash. Agr. Exp. Sta., Pullman, Washington. The authors point out the fact that picking boxes used for one or more seasons are recognized as a source of spores of Blue Mold and that steam sterilization fits in with commercial practice since steam is available in most packing houses where it is used to warm washing solutions. They find a direct exposure to steam for one minute sufficient to kill a very high percentage of the spores. Spores mixed with decayed apple tissue are more difficult to kill, and spores between two pieces of wood, as in joints, may require two minutes' exposure.

Cyanamid. A three years' study of the effects of Cyanamid on fruit trees in Michigan by F. N. Hewetson show that this material may be applied with apparent safety to apples and pears in early spring, 3 to 4 weeks before growth starts if the soil is reasonably moist. Trees on heavy soils were found to be less susceptible to injury from ill-timed applications than those on sandy soils. Some leaf burning is reported on cherries and peaches where the soil was too dry for proper absorption of the fertilizer.

Apple Tree Roots. The roots of Delicious apple trees growing under a mulch in Nebraska have shown in the second year a horizontal development of 9 to 10.5 feet, as compared with 7.5 feet in trees growing under clean cultivation. At the end of the third season six mulched trees had an average root spread of 11 feet on either side of the trunk, 2 feet greater than that of the cultivated trees. The average depth of rooting of the mulched trees was 7.7 feet. It is suggested that apple trees in Nebraska should be spaced widely. 17-yr.-old Jonathan trees planted 30 x 35 feet apart showed roots overlapping in all directions and some of the roots had reached a depth of 35 feet.

Apple Pie. What makes a good apple pie? Here's the score card to be used in judging the pies submitted in the New England Apple Pie Contest. Appearance (20 points), 10 points for color and 10 for size and shape. Crust (40 points), 25 points for texture and 15 for flavor. Filling (40 points), 20 points for flavor and 20 for consistency. Winners in the county contests will compete at the Eastern States Exposition for the state championship, and a chance to try for New England honors in a final contest scheduled for early October. Mrs. Edith Parker of Fiskdale is chairman of the general committee.

Stumpage Value. A white pine tree 20 inches in diameter is said to be worth 5 times as much as one 10 inches in diameter. In the case of an apple tree, trunk diameter has little relation to the tree's real value. In fact, a tree which bears a good crop annually will tend to increase in trunk diameter more slowly than a tree which bears only now and then, assuming, of course, that both trees are equally vigorous.

Phosphate Rock. The United States possesses the largest known deposits of phosphate rock in the world. At probable rates of consumption, the Florida and Tennessee deposits are sufficient to last over 200 years, and the western deposits will last for another 2000 years or so after that.

Apple Energy. The Pennsylvania Department of Agriculture is quoted in Better Fruit as saying that one apple of ordinary size will supply the energy required by the human body in walking $2\frac{1}{2}$ miles.

Feeding New York City. According to H. E. Crouch of the N. Y. Bureau of Markets, only about 15% of the fruits and vegetables used in New York City come from New York State. All states in the Union and many foreign countries contribute to the New York City food supply.

A New Apple. This must be some apple. Quoting from June Better Fruit, "A new apple tree has just been patented by T. E. Graham of Kent County, Michigan. Under Plant Patent No. 278, the apple is described as brilliant, glossy red with a flavor less sour than the Northern Spy but less sweet than the Delicious. The new apple developed as a sport in an orchard of Northern Spy. However, it is larger, ripens earlier, and has a more agreeable flavor than the Northern Spy."

Feathered Friends. U.S.D.A. studies show the Baltimore oriole and the barn and tree swallow to be friends of the farmer. The former bird has been accused of damaging grapes and garden peas. But caterpillars have been found to be its favorite fare and it also eats quantities of plant and bark lice, ants, wasps, grasshoppers, spiders and weevils. Swallows consume vast quantities of harmful flying insects.

Apple Exports. The movement of apples to Great Britain is well illustrated by these loadings out of Boston. Aug. 27, Laconia, 4652 boxes. Sept. 1, California, 4757 boxes. Sept. 5, Franconia, 4740 boxes. Eight other ships are scheduled to sail from Boston between Sept. 10 and Sept. 30.

Spraying. A new publication covering the essentials in spraying and dusting fruit trees has recently come off the press and is now available from the State College in Amherst or from your county agent. Ask for Leaflet 178, "Spraying and Dusting Fruit Trees."

Old Timers. How long will a small fruit planting last? Some light on this question comes from a story by E. H. Burson in the Rural New Yorker. He reports a blackberry planting which fruited well for 36 years, a purple raspberry patch paying well in its 20th season, and 50-yr.-old currants still bearing fruit. In Massachusetts, we know of one raspberry planting well over 20 years of age, still bearing good crops.

Hay to Burn. O. L. Wyman of the Univ. of Maine makes a pointed comment in a recent issue of Maine Fruit Notes: "Professor Waring left a note on my desk the other day in which he said, 'I saw a man raking a field and firing the windrows, and unmulched orchards apparently on the same farm.' Can't we stop practices of that sort?" We haven't seen any firing of windrows in Massachusetts, but there are plenty of rain-soaked haycocks, worthless as hay, waiting for some enterprising orchardist to place them where they're most needed.

Cherry Fruit Fly. A motorized laboratory is assisting in the cherry fruit fly inspection work being conducted in 19 Michigan counties this season by the State Dept. of Agriculture. Spraying dates are determined by noting the first emergence of the flies, as is done in New England with apple maggot, a close relative. A reduction in number of infested properties in Michigan is reported this year.

"Culls" Vermont is considering a change in apple grades which would prohibit placing more than 15% below Utility Grade in the "Unclassified" pack. This change will tend to make the "Unclassified" a better apple. To take care of poorer fruit a "Cull" Grade is proposed and provision is made for marking such fruit "Culls."

Grape Pollen. Artificial pollination of grapes is being tested at the Fredonia laboratory of the N. Y. State Exp. Station. A suitable pollen mixed with lycopodium powder dusted on blossom clusters yielded, in one case, 50% more fruit than the untreated clusters due to the greater number of berries on the treated clusters. Brighton, Herbert and Salem are among the self-sterile or imperfectly fertile varieties. F. E. Gladwin concludes that artificial pollination is entirely feasible from a commercial standpoint as a means of improving the appearance of the clusters as well as greatly increasing the yield.

Grafting Wax. H. A. Cardinell of Michigan is experimenting with asphalt emulsions in top grafting. Ten modifications of brush wax formulas and 8 asphaltic preparations were tested on 1,741 cleft grafted scions. The average of 4 grafting wax formulas using resin as a base was 94% successful; of 4 formulas using abietic acid as a base, 85%; and of 6 asphaltic emulsions, 88%. All were satisfactory from the standpoint of actual practice.

Apple Cuttings. A new method of rooting apple cuttings is being developed at the U.S.D.A. National Agricultural Research Center, Beltsville, Md. F. E. Gardner reports that etiolation (a term

which signifies blanching due to the exclusion of sunlight) is an important factor in the production of roots from stem tissues of the apple. The method is as follows: A piece of black insulating tape, wrapped 4 or 5 times around a young shoot in early spring is allowed to remain until fall. McIntosh shoots, thus treated, resulted in a high percentage of rooting, but only when leaf bud scars were covered, since the new roots develop from the bud axils. Marked differences were noted in the response of other varieties. Attempts to apply the etiolation procedure to pears met with indifferent success, and with sweet and sour cherries, no success at all.

Strawberry Plants. In experiments at the R. I. Exp. Sta. reported by E. P. Christopher, spaced strawberry plants of the Howard 17 and Dorset varieties developed a much larger number of leaves than did those in matted rows. With mother plants placed 24 inches apart in the row, a marked increase in number of leaves on the young runner plants was noted with each increase in runner spacing. Determinations of leaf area per plant showed that the more runners per mother plant, the smaller the leaf area per plant. The matted row plants had not only the smallest number of leaves but the smallest average leaf size and the smallest leaf area per plant. The development of large, well-developed plants, capable of large yields, is favored by adequate spacing.

Leaf Activity. Recent work at the N. Y. Agr. Exp. Sta. shows that photosynthetic activity in apple leaves is markedly reduced when the temperature is high. This suggests that the most favorable conditions for starch accumulation in the tree occur during the latter part of the season instead of midsummer. And that, in turn, emphasizes the need for maintaining healthy leaves through August and September, at least. Leaf hopper, red mite, spray injury, and scab are a few of the handicaps which the tree encounters in the process of manufacturing and storing starch to supply the needs of the tree the following spring.

Soil Moisture. Fruit circumference measurements and soil moisture readings in a Hudson Valley McIntosh orchard have recently been reported by D. Boynton. Lack of rainfall for as brief a period as 2 weeks in a season of normal precipitation caused a reduction in fruit growth on trees growing in a gravelly loam soil which permits rooting to a depth of only 2 feet. There was a drop in soil moisture from about 35% of available capacity to the wilting percentage in 13 days. On an adjacent plot where the soil approached 4 feet in depth, the wilting percentage was never reached and there was no slowing down in fruit development.

Sweet Cherries. In a study of 45 varieties of sweet cherries, M. B. Crane and A. G. Brown find 11 incompatible groups, within which all self and cross-pollination failed. Self-incompatibility was found to be the rule and cross-incompatibility rather frequent, and always expressed reciprocally. Where varieties are incompatible, it means that the growth of the pollen tube down the style is arrested, thus preventing fertilization of the seed embryo, or ovule.

1938 Apple Crop. The N. E. apple crop will approximate 7,100,000 bu. which is 25% less than the 1937 crop and 11% less than the 10-yr. average (1927-1936), according to the September 1 estimate. The Massachusetts crop is estimated at 2,822,000 bu. compared with 3,465,000 last year. The U. S. crop is now estimated at 82,187,000 bu. while the 1937 crop was 115,501,000 bu.

Peach Leaves. Peach trees are subject to a large number of ailments which manifest themselves in a bewildering array of leaf symptoms. The list includes several virus diseases as well as diseases of bacterial and fungus origin, spray injury and mineral deficiencies. Typical symptoms of one ailment may be masked by another, as for example "X-Disease" and arsenical injury. More light on the diagnosis of peach ailments is being shed by the work of Weinberger and Cullinan at Beltsville, Md. Peach trees are being grown in sand cultures supplied with nutrient solutions lacking respectively, nitrogen, phosphorus, potassium, calcium, etc. Trees supplied with a complete solution made very satisfactory growth and developed fine color. The Iron-minus trees dropped their younger leaves first, as contrasted with older leaves first in the Magnesium-minus trees. Both showed chlorosis (loss of green color). Trees deficient in manganese gradually assumed a dull, yellowish-green color. A lack of boron produced rapid and severe effects, in which dark green, water-soaked spots and exuding sap appeared on the growing tips and the roots were poorly developed.

Red Mite in Michigan. A new development in red mite control in Michigan is the use of bill poster's paste as a late summer spray. Quoting from the Traverse City Record-Eagle, "The newest warning of Professor Ray Hutson of the entomology department of Michigan State College is against the red spider which threatens to defoliate enough fruit trees to cause tremendous loss in quality and size of fruit as well as tree vitality. Orchard owners who have used a lime-sulphur spray within the last two weeks can use bill poster's paste for control of the red mites. This material differs from flour and water paste as bill poster's paste is cooked under pressure."

Beach Plums on Nantucket. The beach plum crop on the Island of Nantucket has been somewhat of a disappointment this year. The bushes bloomed profusely last spring but the set of fruit was very light. On some sections of the Island the crop was not worth picking. Unfavorable temperatures at blossoming time are believed to be partially responsible. Weather at that time was reported to be too cold for bee activity. The crop of beach plums in some parts of the towns of Sandwich, Truro, and Provincetown was much heavier. Several hundred bushels of beach plums were gathered on Cape Cod this season.

1938 Cranberry Crop. The Massachusetts Cranberry Crop this year is expected to total 370,000 barrels, compared with 565,000 barrels in 1937, and 389,800 barrels the ten year average for 1927-1936. The crop forecast for the United States this season is 529,600 compared with 877,300 in 1937.

W. H. Thies
Extension Horticulturist

Some Suggestions on Salvaging Hurricane Damaged Apple Trees

At a recent meeting of New England Extension Horticulturists in Worcester, current opinions on the salvaging of trees were carefully sifted. Following is a brief outline of the conclusions reached:

1. Which trees to salvage.

Permanent trees

in good vigor,
on deep, well drained soils,
of profitable varieties,
on which $\frac{1}{2}$ to $\frac{2}{3}$ of the leaves remain green until frost,
with not more than $\frac{1}{2}$ of the roots exposed,
are worth trying to salvage.

Filler trees

which are not due to crowd within 5 years should be considered as permanent trees and treated as outlined above.

2. Which trees not to salvage

Permanent trees

whose trunks are in a nearly horizontal position and where serious root injury is suspected,
with more than $\frac{2}{3}$ of the roots exposed,
whose leaves were dry and brown before frost,
of unprofitable varieties,
of poor vigor (due to mice, winter, disease or starvation),
in very poor soils,
that are past their prime,
are probably not worth trying to salvage.

Filler trees

which are already crowding,
which are about to crowd and have more than $\frac{1}{3}$ of the roots exposed (more than slightly damaged),
of poor vigor,
of unprofitable varieties,
are probably not worth trying to salvage.

Further Suggestions

Act quickly. Tree roots are injured when the temperature drops to 15° above zero.

Avoid bruising the bark of the tree.

Before raising the tree dig underneath enough to permit the roots to fall back to their original position.

Pull the tree back slowly to avoid more root breakage.

Puddle the soil around the roots or tamp the soil well to avoid air pockets.

After up-righting the tree, anchor it securely, and also guy it toward the prevailing winds. 3 well placed wires are advised.

Attach guy wires as high in the tree as is practical.
Fill in around the trunk with soil.
Upright trees that are loose in the ground should be anchored.
Delay all pruning until spring.
Delay fertilizing until spring.
The mulching of salvaged trees this fall is desirable.
Protect the tree from mouse injury.

Mouse Control Meetings Now Under Way

In cooperation with the Massachusetts State Department of Agriculture and the Massachusetts Fruit Growers' Association, the U. S. Biological Survey is again conducting a series of meetings on orchard mouse control. Tree roots, loosened during the recent hurricane, will be especially subject to damage this winter, and orchardists are urged to intensify mouse control measures. Abundant grass cover during the summer months has resulted in heavy infestations, even in orchards where good control was obtained during the past winter. Plans should now be made to begin control operations about November first.

Dates for meetings in the various counties are listed below. Time and place of meetings may be secured from the respective county agricultural agents. Dates of meetings in Essex and Plymouth counties have not as yet been determined.

Oct. 3 - 15	-----	Middlesex County
Oct. 13	-----	Franklin County
Oct. 17 - 22	-----	Worcester County
Oct. 20 and 21	-----	Hampden County
Oct. 25, 26 and 27	--	Hampshire County
Nov. 3	-----	Bristol County

Lead Tolerance Raised to .025 Grains per Pound

Following receipt from the Treasury Department of a statement that investigations by the Public Health Service indicate that the health of consumers will not be endangered by the change, the Secretary of Agriculture has issued notice that the quantity of lead residue permitted on fruits shipped interstate will be raised to 0.025 grain per pound of fruit. The lead tolerance previously enforced under the Food and Drugs Act was 0.018 grain per pound. The tolerances for arsenic and fluorine residue remain unchanged at 0.01 grain per pound.

Quoting from a letter of Sept. 19 by Secretary Wallace to Growers and Shippers of Apples and Pears, "The findings of the Public Health Service, so far, have failed to reveal evidence of untoward effects on human beings from the ingestion of lead arsenate in excess of present tolerances. Since it is their understanding that the urgency for changing the tolerance to which you refer relates to the tolerance for lead and that the present tolerance for arsenic can be met more easily in practice, should the Department of Agriculture place the tolerance for lead at 0.025 grain per pound, there is nothing in their findings to date to suggest that this increase above the present tolerance would be sufficient to endanger the health of the consumer."

Tilted Trees Need Attention, Says Oskamp

Joseph Oskamp, Extension Horticulturist in New York State,

offers the following advice concerning trees loosened by the recent hurricane: "As a result of the recent heavy rains accompanied by very high winds, many young fruit trees have a bowl-like depression from 2 to 6 inches deep around the trunk and are leaning badly. Some older trees have had the roots broken on the windward side and are leaning badly. If it is desired that these trees be straight in the future, it will be necessary to straighten them up, and where the roots have been disturbed or broken to such an extent that firming the soil will not support the tree, it will be necessary to provide the mechanical support by means of stakes and braces until the tree again becomes well established in the soil. This may require the greater part of another growing season. In many cases with young trees 3 or 4 years old, filling the depression at the base of the tree with earth and tramping it firmly, while holding the tree in place, bent as far as possible into the direction of the prevailing wind, will be satisfactory. In cases, however, where the young trees are exposed to high prevailing winter winds, additional bracing may be necessary, in which case a single stake driven well into the ground on the windward side may suffice. The tree is wired to the stake using old rubber hose or other padding to keep the wire from chafing the trunk.

"The depressions which have developed at the base of young trees due to the wet condition of the soil and swaying action of the tree in the wind, exposes the upper roots to most serious winter killing, unless earth is put back and tramped well. Any part of the tree which has been covered with soil during the summer and then becomes exposed at this time of the year is in a very precarious condition, for such parts will not stand a temperature of much below freezing without injury or death. Therefore the filling and tramping of these sunken areas should not be neglected. It is best done now while the ground is soft and the tree can be straightened, if you have not done so already."

Tests with Clonal Stocks

In 1937 the Department of Pomology started several cooperative tests of clonal or asexually propagated apple stocks in different parts of the state. We will have available in the spring of 1939 over 2,000 trees of common and new varieties budded on known clonal stocks. These may be expected to produce trees varying from quite dwarf to standard sized trees. We would like to place these with good fruit growers in lots of 100 to 500 for the purpose of learning more about the value of these stocks in our state. Any fruit grower interested is invited to correspond with the Department of Pomology, M. S. C.

J. K. Shaw

A New and Dangerous Apple Disease in Maine

The Northwestern Apple Tree Anthracnose disease was recognized this summer in Maine apple orchards. It has been a damaging disease in the Pacific Northwest for the past 40 years, but this apparently is the first report of its occurrence outside that area with the exception of a single report from Nebraska several years ago. M. T. Hilborn of the Maine Experiment Station, who officially announced the presence of the disease (Maine Fruit Notes, Vol. 12, No. 7, Sept. 1938), indicated that the disease was first ob-

served in 1936, has spread rapidly since, but was identified only this summer. He says, "At present the disease has been found only on trees of the McIntosh variety." In the West, Baldwin is reported to be particularly susceptible.

It is suggested that Massachusetts orchardists and county agents be on the lookout this fall and winter for Anthracnose, particularly on McIntosh and Baldwin. Reports of suspected cases and specimens of diseased branches are requested (please mail any specimens to me, Clark Hall, M. S. C., Amherst, Mass.). The disease attacks both the branches and fruits. It is rather easy to diagnose where various ages of branch cankers are present. The young current year cankers are very characteristic and will furnish a ready clue even though older cankers are few or absent. This year's cankers appear as few to many, small, circular, slightly depressed, reddish brown lesions, varying from $\frac{1}{4}$ to $\frac{3}{4}$ inch in diameter, scattered promiscuously on branches up to 2 or 3 inches in diameter and on young trunks. If any reader of Fruit Notes is interested in a complete description of the disease, including its various symptoms and its control, a post card to the writer will bring full information.

O. C. Boyd

Stray Thoughts

For the country as a whole, the combined 1938 tonnage of apples, peaches, pears, cherries, plums, prunes, apricots, and cranberries is 21% smaller than the combined production of these crops in 1937 but is 2% above the 10-year average.

There are 865,000,000 persons gainfully employed in the world, and 550,000,000 of them are engaged in agriculture, according to the Pennsylvania Department of Agriculture.

If soap is used on fresh fruit stains, it will tend to set the stain, according to Cornell Bulletin E-356. A free copy of this publication may be obtained from the Office of Publications, Roberts Hall, Ithaca, N. Y.

It is not very generally known that apple tree roots grow during the winter. Protected against low temperatures by the soil, the roots find favorable growing conditions long after the top has become dormant. The temperature of the soil six inches beneath the surface may be only slightly below freezing even though the air temperature is below zero. This has a direct bearing on the salvaging of storm damaged trees. If the roots are again brought into intimate contact with the soil in the very near future, they should make a good start in the regeneration of fibrous roots before spring.

Pruning of a fruit tree at this season is not recommended because it would rob the tree of much needed growth materials and perhaps endanger its recovery. Carbohydrates, made in the leaves, are gradually moved to points of storage in the trunk and roots, particularly the latter. These materials are of much importance in the proper functioning of the tree next season. Limbs removed before translocation has taken place, mean a distinct loss to the tree, to say nothing of the dying back and slow healing of fall pruning wounds.

In the next issue of Fruit Notes there will appear a summary to date of the apple purchase program of the Federal Surplus Commodities Corporation in New England. Details of this program may be obtained from your county agricultural agent or from the headquarters in Concord, Mass. (Tel.-Concord 846).

A striking example of injury from root strangulation has just been noted in two large maples uprooted by the storm in Fitchburg. Both trees showed a severe constriction of the trunk a few inches below the ground level. Immediately above was a swollen area like an apple tree graft which has outgrown the stock. Examination showed in each case an encircling root several inches in diameter, just below the ground level which had a direct influence on retarding growth of top and weakening the trunk at that level. We have here a good lesson in the need for spreading out roots of nursery trees at time of planting in spring.

A terrific hurricane is reported to have struck the vicinity of Plymouth in August, 1635. The next one of serious consequence occurred in 1815 when the original Baldwin apple tree is reported to have blown down. And now the hurricane of 1938. Three real storms in about 300 years. That should leave plenty of time for about three generations of apple orchards in New England before the next real storm.

Anyone interested in the framework of trees will find profitable study among the many shade trees partially broken down by the storm. Here we find thousands of examples of trees which developed with narrow angled crotches, and a resulting inability to form a strong bridge of wood to hold the two or more sections together. Instead, there was a plane of weakness where successive layers of bark were crowded together. Moral: In shade trees as well as in fruit trees, there is need for a semblance of "leadership" instead of allowing the top to divide into more or less equal sections with narrow angled crotches.

Adequate anchorage of a loosened tree seems to be of great importance. Certainly, if the tree is to be swayed this way and that by winds from different directions, it can never re-establish its damaged root system. The anchorage must be so planned that there will be no appreciable swaying in any direction. Three well placed stakes or "deadmen" should do the trick in most cases. Props should be considered as only temporary or as supplementing the guy wires.

Canners of Bartlett pears have sometimes been troubled by the fruit turning to an undesirable orange yellow instead of keeping the more desirable cream color. Scientists of the U.S.D.A. find that color as well as quality of Bartlett pears is determined by the action of two enzymes, oxidase and catalase. Fruit picked too soon is high in oxidase which causes the fruit to discolor. As the fruit ripens on the tree the oxidase decreases - and further decreases in storage. For best quality, pears should not be allowed to ripen on the tree. They should be picked when mature and then ripened in a cool, dark storage. (These suggestions are found in the last issue of Better Fruit.)

W. H. Thies
Extension Horticulturist

Biological Survey Reports Peak Mouse Population

Unusually heavy infestations of meadow mice have been reported by orchardists from every section of the state, according to W. W. Dykstra of the U. S. Biological Survey at Worcester. The seriousness of this pest problem was recently demonstrated in an orchard near Berlin, Mass. where an area was thoroughly trapped. On the basis of figures obtained, it is estimated that the probable population in this orchard approaches 500 per acre. The amount of food eaten by a single meadow mouse during a year has been estimated at 24 to 36 pounds. 500 meadow mice will consume 6 to 7 tons of vegetation per year. Fortunately, these heavy populations are confined to small areas and are not general.

Mice are among our most prolific animals, and it is possible for a single pair to have nearly a million descendants in five years. Their populations are known to rise and fall in cycles of about four years. Increased numbers during recent years indicates a peak population this fall. Predators, disease, shortage of food and adverse weather conditions are natural control factors. These rodents constitute an important part of the food chain of our higher animals, and an even balance is generally obtained. Cultivated crops, resulting in more food, and destruction of predators by man tend to offset this balance. Heavy grass cover favors more mice, since it provides both food and protection from natural enemies. Increase in predators, such as foxes, skunks, and shrews, generally accompanies or follows heavy mouse populations until a balance is again established. Presence of numerous skunks this fall may therefore be partially the result of increased mouse populations.

Abundant grass cover this summer provided ample food for these rodents. With the coming of cold weather, available foods are greatly reduced, and mice frequently resort to the bark of trees and shrubs as a source of food. Danger of injury from these pests has also been increased as a result of the recent hurricane. Tree bases and roots, loosened during the storm, are ideal homesites this winter. Orchardists are therefore warned to institute adequate control measures as soon as possible.

Notes from the West Cambridge Auction Market

C. F. Dutton, auctioneer at the Farmers' Regional Produce Market, has this to say about the fruit situation: "The auction has suffered considerably from the hurricane and other climatic conditions. We are having one sale a week on Thursdays at 4 P.M., and as there are not a great many apples, it seems likely we shall continue on that basis. Good Macs in crates sold on October 27 at \$1.87½ to \$1.90, with Fancy Drop Macs at \$1.25 to \$1.40. There

have been a lot of Baldwin drops on the auction which in most cases were put up for the government, and then turned down by the inspectors. This stuff sells hard at 25 to 50 cents. There have been hardly any good Baldwins. As many farmers were frozen out last spring, then washed out in July and blown out in September, it looks like a quiet season on the auction. Have plenty of buyers for good quality apples, but do not want any more cider or cull stock."

Two Fruit Conferences

Fruit matters of interest to growers throughout the state will be considered at two committee meetings to be held at Stockbridge House in Amherst, Monday, November 7. At 10 A.M. there will be a session of the Fruit Industry Committee to discuss the fruit extension program for the coming year. Representatives of the various College departments having to do in one way or another with the fruit industry will attend. The recent hurricane has introduced some real problems in the fruit industry and an attempt will be made to adapt the extension program to a changing industry. Problems of tree salvage, replanting, diversification, credit, etc., will be taken up. The second conference will bring together members of three College departments, Pomology, Entomology and Botany, and a few county agricultural agents to discuss needed changes in the fruit spray and dust schedules. This conference is an annual affair, out of which is developed the printed spray schedule for the various fruits so familiar to fruit growers in Massachusetts. The entire afternoon will be spent in assembling all available evidence on experimental work, new materials and new methods of pest control, in order that the 1939 spray schedule may again represent the latest word in reliable fruit pest control information.

What Does "Clonal" Mean?

The word "clone" was introduced several years ago by Dr. H. J. Webber, and it has come into common use among research pomologists. To the fruit grower, it means the same as "variety," that is, a type of fruit that can be propagated by buds, but not by seeds. This is in sharp distinction to the term "variety" as used for most vegetables and flowers which are grown from seeds. All fruit varieties are clones, but fruit stocks are sharply divided into clones and seedlings. The seedling apple stocks, commonly used, are grown from seeds obtained from cider mills in the United States and certain European countries. A clonal stock comes originally from a seed just as do the original trees of named varieties, and like them it is propagated asexually, that is by buds. A clonal stock once obtained, however, is propagated by layering, that is by heaping moist soil around the base of green shoots which induces them to form roots, thus producing rooted stocks suitable for budding.

Most clonal stocks can also be propagated by root cuttings or by "nurse root grafts." In the latter case, a scion of the clonal stock is whip grafted on a seedling root and planted in the usual way. After a year or two in the nursery, the little trees are dug. By this time the clonal scions will have produced roots of their own. The seedling root pieces can therefore be cut off

leaving clonal stocks like those obtained from layers. The outstanding difference between seedling and clonal stocks is this: Seedling stocks vary like any group of unselected seedlings, while all individuals of a clonal stock are exactly alike except for differences due to environmental influences. J. K. Shaw

Orchard Insects as Related to the Hurricane

Ever since the hurricane, we have been searching for some evidence that the storm brought some possible relief to next year's pest control problems and in that way partly compensate for the tremendous damage to the trees themselves. Frankly, there is little encouragement evident at this time, although it is impossible to get satisfactory information on most pests. Red mite eggs are generally scarce but they have been before, and we have learned from experience that so long as any are present a troublesome infestation can develop the following season.

Leafhoppers had just reached maturity on September 21 and were most likely to be influenced by the storm. For a week after the storm they were surprisingly more abundant than might be expected but by the middle of October they had disappeared very noticeably in some orchards. Life history records in New England (Garman, Conn. Circ. 111, March, 1936) show that egg laying begins about September 20 and does not reach its height until about October 15. Thus, under normal conditions there would be very few eggs laid before the hurricane. Many of the leaves which remained on the trees after the storm were so dried that they were unsuitable for leafhopper feeding. Under these conditions some of the hoppers moved around from tree to tree, while others laid their eggs in the bark earlier than usual and disappeared. Records over the past 10 years also indicate that severe leafhopper infestations are most likely to occur during or immediately following dry weather in July, August, September, and even the most imaginative fruit grower could not classify the summer of 1938 as dry.

Therefore, if anyone is foolish enough to make predictions about orchard insect conditions in 1939, possibly he might raise a faint whisper that the white apple leafhopper will be less abundant and troublesome next year. W. D. Whitcomb.

Items From Here and There

One Fundamental Idea. Most of the pomological wisdom that I acquired during my undergraduate days forty years ago has gone to the discard. One thing that remains 100% true is the characterization of a good orchard soil. A good orchard soil is "deep, well drained, and at the same time retentive of moisture." This is still and probably always will be, sound doctrine. Much has been added to this, and we place increased emphasis on the specification that the soil must be deep. Orchards of the future planted on any soil that does not conform to these specifications are likely to be sources of loss and not of profit for the fruit grower. (J. K. Shaw)

Sterilizing Old Apple Boxes. Old apple boxes used for storage purposes become covered and the joints filled with spores of blue mold,

the common soft rot of stored apples. Experiments in the state of Washington (Wash. Exp. Sta. Bul. 357) indicate that a two-minute exposure of old boxes to streaming steam was sufficient to kill all blue mold spores present. (R. A. Van Meter)

Fertilizers Go West. In the 11 western states, 11,412,789 acres of farm land are now irrigated. According to the U. S. Census of 1934, this is 87.6% of the irrigated area of the United States. Until a few years ago little fertilizer was used on this irrigated area. The total usage of all fertilizers in the above area and in British Columbia last year was 307,935 tons. About 78% of this tonnage was used in California.

A New Soils Bulletin. "Soil Depleting, Soil Conserving and Soil Building Crops" is the name of a new Leaflet No. 165, written by A. J. Pieters and distributed through the U.S.D.A. in Washington, D. C. Here is a very interesting and authoritative publication by a man who knows soils and crops. A copy may be had for the asking.

Potassium Under Mulch. Wander & Gourley of the Ohio Agr. Exp. Sta. report this interesting discovery in a mulched orchard. "In an orchard where potassium as a whole was found very low and where applied potassium failed to move downward into the root zone, there was found a very large content of potassium to a depth of 24 to 32 in. or more beneath a 38-year-old mulch. In no case had potassium fertilizers been applied to the mulched trees. The same condition was found in a nearby orchard where mulch had been applied to part of the area for 22 yrs. The soil beneath two mulched trees had a content of 1,000 lb. per acre of available potassium to a depth of 2 ft., while 40 ft. distant under clean cultivation there was less than 175 lb. of potassium to a 2-ft. depth."

Agricultural Planning. The September Extension Service Review says that more than 2,200 county agricultural planning committees have been functioning during the current year as shown by reports from 43 states. Land use mapping work has been conducted in 951 of these counties.

A New Blueberry Bulletin. "Improved Blueberries" is the title of Extension Circular 215 by Latimer and Smith of the Univ. of N. H., Durham, N. H. Among the items discussed are location and soil, soil preparation, planting, varieties, cultivation, soil fertility, pruning, insects, improvement of wild high bush blueberry areas, blueberry propagation, seeds, rhizomes, transplanting, softwood cuttings, hardwood cuttings and topworking.

Beach Plums. A new mimeographed publication, "Culture of Beach Plums in Massachusetts," has just been prepared by Bertram Tomlinson, County Agricultural Agent in Barnstable County, and will be available from the State College or from the author in the near future. Ask for Extension Circular No. 46.

Walnut Hulls. Three years ago, the California Walnut Growers Association was paying \$30 a day to have walnut hulls hauled away and burned. Now, the association received \$1,000 a month for the hulls. Research has shown that they have many commercial uses.

Here's a Wild One. At the Soil Conservation Service Grass Nursery in Pullman, Washington, a plot of Siberian wild rye grass, a new-comer, has such an aggressive root system that it has to be fenced as a safeguard against its uncontrolled spread. The fence is a sheet of galvanized iron extending nearly three feet down in the ground. One plant row got away before the nursery people realized what they were dealing with, and roots shot out twelve feet with the center stolon going down three feet.

An Early Immigrant. The honeybee as we know it in America was not originally a native insect, for there were no true honeybees in this country when the first Europeans arrived here. Of course there were the many kinds of wild bees which we still have, and there were many bumblebees native to this country. The value of the true honeybee was early recognized by the colonists, and as early as 1638 importations of honeybees were made to New England. The earliest importations were of the black bee or so-called German bee from Europe, and that type is still very common in some sections of the country. However, because the yellow or Italian bee was later found to be much more gentle and tractable, it has replaced the black bee to a large extent.

Winter Injury in Washington. The state of Washington experienced injury to fruit trees in 1935-6 of a similar nature but less serious than that in New England in 1933-4. The injury was confined to the above ground portion of the trees. In some cases young trees developed severe bark cracks, and where the bark was tacked down early, recovery was facilitated. Yellow Newtown, Golden Delicious and Red Rome showed greatest trunk injury. Young pear and sweet cherry trees were injured about as seriously as apples. Crotch injury was particularly serious with trees located in the higher valleys. Evidence from pruning injured trees indicates the desirability of deferring pruning until after the severe winter weather is past.

Philosophy of Thoreau. "After having read various books on various subjects for some months, I take up a report on farms by a committee of Middlesex Husbandmen, and read of the number of acres of bog that some farmer has redeemed, and the number of rods of stone wall that he has built, and the number of tons of hay that he now cuts, or of bushels of corn or potatoes he raises there, and I feel as if I had got my foot down on to the solid and sunny earth, the basis of all philosophy and poetry, and religion even. I have faith that the man who redeemed some acres of land the past summer redeemed also some parts of his character. I shall not expect to find him ever in the almshouse or the prison. He is in fact so far on his way to heaven. When he took the farm there was not a grafted tree in it, and now he realizes something handsome from the sale of fruit. These, in the absence of other facts, are evidences of a certain moral worth." (Henry D. Thoreau's Journal, Vol. VIII, pg. 327, written about 1850.)

Striped McIntosh and the Cull? Grant Hitchings, an Onondaga County, N. Y. fruit grower, makes a suggestion in the Rural New Yorker that if anyone was **unfortunate** enough to plant trees of the striped strain of McIntosh, he should immediately graft them over to a desired

strain. He also says that the cull question will settle itself when our northeastern growers are ready to amend our grading laws to separate all apples into 4 grades, - Fancy, U.S.No.1, Utility and Culls, making it a misdemeanor to mix any one grade with another, either up or down. To do this would, of course, require every grower to grade rigidly. The legal status of such a requirement is still very much in doubt.

Activities of the F.S.C.C. Mr. Saxon Clark reports as follows concerning the federal apple purchase program for New England. "Figures for Connecticut and Rhode Island are not exact as the apple purchase program was not handled from this office.

Massachusetts	321,410 bushels	or	484 cars
Maine	6,300	"	" 10 "
New Hampshire	16,215	"	" 27 "
Vermont	2,464	"	" 4 "
Totals	346,389	"	" 525 "

Connecticut	318 cars
Rhode Island	25 "

By Counties in Massachusetts:

Middlesex	176,007 bushels	Norfolk	6,563 bushels
Worcester	50,228 "	Essex	1,932 "
Hampden	48,162 "	Bristol	1,567 "
Hampshire	23,446 "	Plymouth	1,470 "
Franklin	12,035 "		

It is impossible at this time to give the number of growers participating in this program. Eighty percent of the fruit went outside of New England, mostly to the southern states - Louisiana, Florida, Alabama, Mississippi, Georgia, North and South Carolina and Tennessee."

Going Down. The annual per capita consumption of apples as fresh fruit by the American public is strikingly shown by the following figures:

Year	Per Capita Consumption
1900	90 lbs.
1910	51 "
1920	44.5 "
1930	33 "
1935	27 "
1940	? "

On the other hand, the consumption of California oranges, Texas grapefruit, peaches, lemons, pears, cherries, Hawaiian pineapple and bananas is increasing. Truman Nold of Lawrence, Kansas says: "It is no easy job the apple men face. Their competitors have been organized for a longer time, and have learned how to operate on a broader, more comprehensive base. Without exception, the most successful ventures have followed these steps: 1. Getting and keeping the growers sold on the necessity for united action. 2. Rigid control of the off-grades. 3. Planning a steady marketing throughout the season. They have found it impossible to play the market. 4. Making sure that uniform supplies are available throughout the entire selling season, and making sure they reach the eventual consumer in the best possible condition. 5. Then advertising to the wholesaler, to the grocer and to the public."

W. H. Thies
Extension Horticulturist

Cooperating with Nature in Salvaging Damaged Trees.

What things count most in the recovery of a hurricane damaged tree? Thousands of trees have been put back in an upright position in Massachusetts with the widest possible range in technique and in thoroughness. Some will return to normal production promptly. Others will fail completely. Then there will be a big middle class of extremely variable performance. This is the class that deserves our careful attention. We can't afford to nurse along a lot of half dead trees. Better to have young trees growing in their place. I wouldn't give a nickel a dozen for some of the "salvaged" trees in their present condition. Should these trees be fertilized this fall? Should they be pruned this fall? The answer to both of these questions seems to be "No." Neither pruning nor fertilization at this season offer any assurance that the tree will be better off next season. In other words, these are not the essential items in the recovery of the tree. In fact, fall pruning has proven detrimental when followed by a severe winter. And fall fertilization may occasionally favor winter injury. So we'll have to look farther if we are to find the secret underlying successful recovery.

It is my opinion that the secret lies in maintaining, so near as possible, normal growing conditions. And that, of course, is easier said than done. But it seems of little importance to think in terms of this or that combination of mineral elements, when the tree is desperately in need of an unfailing supply of moisture. It seems equally short sighted to give attention to bracing and guying alone while a major portion of the root system is still surrounded by air pockets if not actually exposed to the rigors of a New England winter. The terrific shock which comes to a tree when half or more of its roots are broken off, needs scarcely to be pointed out. To expect such a tree to resume normal production merely by setting it "back on its feet" and placing a prop under one side is to lose sight of several very important factors.

Briefly stated, the remaining roots are of more importance than the top. They must be carefully protected from low temperatures by a generous layer of soil and they must be brought into intimate contact with the soil. Root growth will continue during the winter if suitable growing conditions are provided. A layer of mulch material over the injured roots will provide added insurance and will be especially valuable next summer when there is more demand for water and a smaller supply in the soil. A normal pruning and an application of a nitrogenous fertilizer over the broken root ends early next spring should also prove beneficial. Then, too, the tree must be held rigidly in place if a new root system is to be developed. There must not be appreciable swaying in any direction. Stakes and guy lines will need careful going over between now and spring. Props, where used to supplement wires, are especially subject to shifting as the ground softens in spring. Cases have come to our attention of slackened guy lines, of partially pulled stakes and of trees tipped in an unexpected direction. Shortcomings of this kind bespeak

faulty technique, and now that the season for actual raising of trees is necessarily over, it will be well to go over every tree again and insure the effort already expended. Then there is the matter of mouse control. It would be difficult to imagine more favorable conditions for the girdling of roots this winter. And mice are unusually plentiful. The new zinc phosphide bait is inexpensive and very effective if properly placed.

In conclusion, the "patient" under discussion is very sick. Heroic measures will be required. No medicine man or magic wand can do the trick. Only as we cooperate with nature in restoring normal growing conditions can we expect to bring the patient back to health and a productive future.

Anchorage Angle Important

Holding a tree in an upright position by means of wires attached to stakes in the ground brings into play a simple principle in physics which can be illustrated by the pull on a sled rope. With the rope parallel to the ground, a pull has its maximum effectiveness because it is in the direction in which the sled moves. With the rope at right angles to the ground, a pull is entirely ineffective in moving the sled forward because it has no component whatever in that direction. But when the rope is at an angle between those two positions, a pull has some effect insofar as forward movement is concerned, the effect increasing as the angle between the rope and the ground level is decreased. All this is self evident. But how does it apply to the effectiveness of guy lines?

Let's assume that the tree is the sled, that the wire is the sled rope. and then, instead of us holding the sled rope, we'll let the stake do it. And of course, the tree is merely to be held where it is. For maximum effectiveness, the wire like the sled rope should be parallel to the ground, and it must be attached at a high level in the tree. But obviously, we can't have the wire parallel to the ground. The next best thing is to approach the parallel position by placing the stake as far as practicable from the trunk. Beneath the tips of the branches is a convenient compromise, keeping in mind the necessity of getting through the orchard next summer with the sprayer. Let's forget about mowing, for the time being. Observations show that some growers have placed the stakes altogether too close to the tree, "because they'd interfere too much with mowing the grass." No wonder that some of the screw eyes have already straightened out, and that stakes have been partially pulled out.

Here are some actual Angle-Tension relationships, which will recall to readers of Fruit Notes a bit of high school trigonometry. An angle of 30° between the wire and the ground level means that the effective pull on the tree is about $4/5$ the tension on the wire. An angle of 45° between wire and the ground level means an effective pull about $2/3$ that of the tension, while a 60° angle gives an effective pull of only $1/2$ the tension and a 75° angle, $1/4$ the tension. Then to make matters still worse, if the tree is shifted appreciably away from the stake, or if the stake is pulled toward the tree, the anchorage is further endangered. What we have been trying to say is this: What's worth doing at all is worth doing well. And while we're going to the expense of buying wire and perhaps rubber hose to prevent bark injury, to say nothing of paying out good money for labor, let's see if our anchorage is secure. The guy lines being placed this fall will probably be essential to the welfare of the tree for at least three, and perhaps five years.

Treating Fruit Tree Wounds

As a result of the September hurricane, there is greater need at present for wound dressings than in most seasons. In order to protect tree wounds a-

gainst wood rot and other pests it is advisable to treat limb-pruning scars over 2 inches in diameter and all deep cuts, bruises, splits or other injuries on the trunks and larger branches. No doubt a few bark injuries were unavoidable during the straightening and reestablishing of trees.

Before wounds are treated, it goes without saying that all broken limbs should first be removed with a clean cut of the saw and all stubs sawed off. Also, the injuries on the trunks and larger limbs should be so shaped and trimmed to insure drainage and proper healing.

Wound Dressings: Any one of the following will be satisfactory to disinfect and protect the wounds: (1) Bordeaux paste, prepared by adding about one quart of water to one pound of a proprietary powdered Bordeaux; stir into a thick paste, and then dilute with enough raw linseed oil (at least one pint) to allow application with brush. After drying, this coating may be waterproofed by applying tanglefoot. (2) Any good tree wound paint such as asphaltum or coal-tar paint. (3) Regular shade-tree formula: Shellac the edges where the cambium is exposed, then apply creosote to the remainder of the wound for sterilization followed by asphalt for lasting protection. (4) Spar varnish may be used as a short-cut treatment instead of (3) but is less permanent. This treatment or the Bordeaux paste should be used for peach and other stone fruit trees since they are easily injured by creosote and asphaltum mixtures.

O. C. Boyd

Weather Conditions in 1938 Unfavorable for Macrocentrus Parasites

The hurricane during the afternoon of September 21 supplied most of New England with enough weather to talk about for many years to come. There were, however, several earlier periods of unfavorable weather which in themselves have made the year 1938 one we would be glad to forget. The rainfall in July, as recorded at the College, was nearly twice the normal for that month and had been exceeded only three times in the last 50 years. Some parts of the State experienced even heavier precipitation. Extremely heavy and frequent showers caused severe damage to crops. Agricultural operations were seriously hampered and often brought to a standstill. These frequent showers, with intervening periods of high temperature and humidity, proved almost ideal for the development of the Oriental Fruit Moth, and at the same time constituted the worst possible conditions for the activities of the parasites, so that on the whole the Macrocentrus parasites released in Massachusetts peach orchards in 1938 proved less effective than in any year liberations have been made.

Similar weather conditions prevailed over much of Connecticut where results with the parasites correspond with those in Massachusetts. In New York and Ohio, however, the prevailing weather was more nearly normal as regards temperature and humidity, and the results with Macrocentrus and similar parasites were very satisfactory, indicating that under normal midsummer conditions, favorable results can be expected from the parasites liberated in the orchard. The New York Experiment Station has observed a direct correlation between parasitism of the twig-infesting larvae and the percentage of infested fruit at harvest time. Where parasitism is high, damage is correspondingly low. Their observations indicate an average parasitism of 25% of the first brood and 53% of the second brood in sections where liberations have been made for 6 to 8 years as contrasted with 4½% for the first brood and 7½% for the second brood in those areas where liberations have been made for only 3 or 4 years, indicating the advantage of successive liberations of parasites over a period of years.

Arrangements are again under way to make possible a supply of Macrocentrus parasites for Massachusetts peach growers during the season of 1939.

A. I. Bourne

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Stockbridge Students Take Market Trip

One of the most valuable features of the course in Marketing given by the Pomology Department is the annual trip to Boston. This is a 2-day trip with the first day devoted to visiting packing houses and farm storages in order that the students may observe how fruit is prepared for market. The second day is spent visiting the various marketing agencies in Boston observing how fruit is sold. The group taking the trip this year consisted of 1 graduate student, 5 Stockbridge seniors specializing in Fruit Growing, 8 Stockbridge seniors specializing in Foods and Food Processing, and the Instructor. Space does not permit a complete discussion of all the places visited and the many interesting things that we saw, so I shall merely attempt to mention a few of the outstanding features of the trip.

At the Regional Produce Market in West Cambridge the Auction had closed just before we arrived, but we were told that the auction method of sale appeared to be gaining in favor and that one grower as far away as Hampden County used this market regularly. It was pointed out that this grower's apples sold at the top of the market or better because they were good apples, honestly packed, and this fact had gained the confidence of the buyers so that his apples were always in demand.

A few observations made while visiting the markets in Boston were:

(1) The effort being made to grade and pack all types of produce so that it will be most attractive. Most of the packs of apples that we saw compared very favorably with other lines of produce. (2) Several lots of apples, especially on the Farmers' Market, had so many blemishes that they reflected no credit on the fruit growing industry. The contrast between these and the better grades, neatly packed, was very apparent. (3) A brand name on a package, provided the apples are carefully graded, is an asset in making sales. Our attention was called to one lot in particular where this had proven to be true. (4) A statement made by the chef at the Parker House is particularly worthy of note. While being shown through the kitchen and store rooms we noticed a box of Cortland apples. We asked the chef how he liked Cortland. He replied, "It is the best apple for baking that I have ever come across." (5) Apple ice cream seems to be popular. We found it being served at Durgin-Park's and at the Parker House. It is really good. (6) The type of package and method of packing appeared to be far less important than the quality of the fruit in the package.

O. C. Roberts

Items from Here and There

New Slant on a Storage Problem. In a recent number of the Journal of Pomology and Hort. Sci., F. Heald and C. West, two English authorities on storage problems, report a spotting of certain late varieties of apples due to their being stored with over ripe specimens of early varieties. The spotting is thought to be caused by ethylene gas given off by the over ripe fruit. Although this type of spotting has not been reported from Massachusetts, there is no reason to believe that it may not occur. Just another reason for storing only fruit in good condition.

(J. S. Bailey)

An Own Rooted McIntosh. Most apple varieties root from the scion very readily when young. It is commonly believed that older trees root much less readily. Last May soil was heaped to a depth of 15 to 20 inches around the trunk of a vigorous 20-yr-old McIntosh tree in Amherst. In early November it was found on removing the soil that many fine roots had grown out from the trunk. This

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1. The first of these is the fact that the majority of the population of the United States is of European descent. This is a fact which has been recognized by the government and the people of the United States for many years. It is a fact which has been recognized by the government and the people of the United States for many years. It is a fact which has been recognized by the government and the people of the United States for many years.

suggests that in a few years the tree would have been partially or entirely on its own roots if the soil had remained undisturbed. Rooting from the scion may or may not be desirable. If one wishes trees on their own roots, the easiest way to get them is to plant trees so that the union is below ground. With clonal rooted trees, rooting from the scion is to be avoided and the union must always be above the ground level. (J. K. Shaw)

Mulch Early. G. M. Darrow of the U.S.D.A., observes in Hoosier Horticulture that low temperature injury in late fall and winter to the crowns and roots of strawberries is one of the important sources of loss to growers in all of the northern states. The advisability of early mulching with straw or other vegetation is stressed.

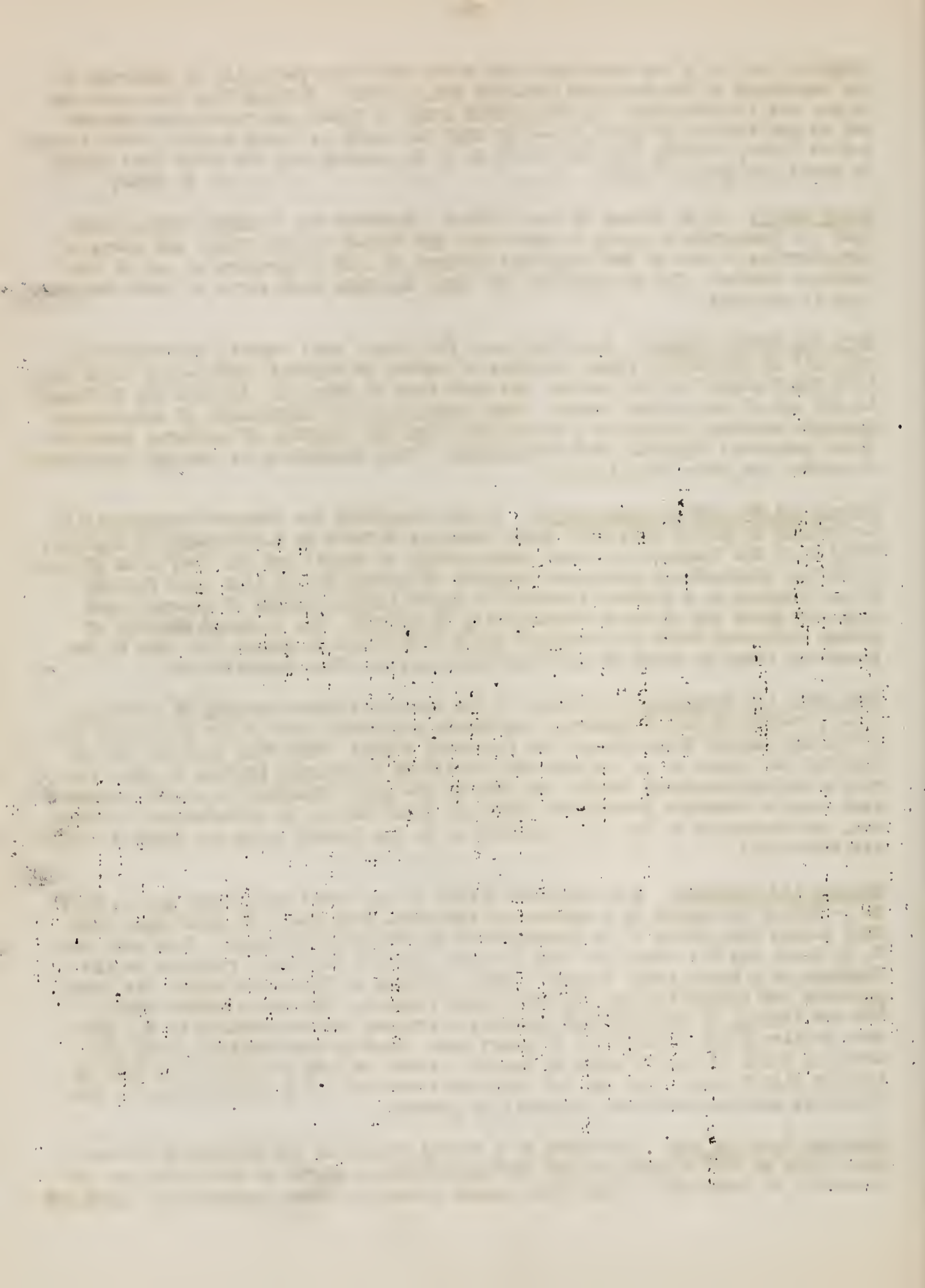
More and Better Leaves. According to a Fla. Hort. Soc. report, approximately one half of the citrus plant consists of carbon in organic combination which has been manufactured in the leaves, and more than 30 chemical elements may be found in the ash of the citrus leaves. This emphasizes the importance of maintaining abundant healthy foliage on a citrus tree and the adoption of cultural practices which encourage vigorous leaf development. This suggestion is equally applicable to apples and other tree fruits.

Potash and Drought Susceptibility. A clew regarding the extreme susceptibility to drought of potash deficient apple trees is offered by L.G.G. Warne in England. Studies of the comparative water conductivity of shoots and the leaf area of trees receiving abundant and deficient supplies of potash showed that insufficient potash results in a decided decrease in shoot length, number of leaves, leaf area per shoot and in water conductivity of shoots. The lessened ability of potash deficient trees to transport water from roots to leaves may help to explain why trees on sandy or gravelly soils are so often unprofitable.

Pear Wood for T-Squares. A letter to the Keuffel & Esser Company of Hoboken, N. J., makers of fine T-Squares, concerning a possible outlet for pear wood from hurricane damaged trees brings the following reply: "The Pear Wood we use is imported and comes to us log run and treated by a steaming process to give the wood a uniform brownish color. We have in the past attempted to obtain suitable pear wood of domestic growth, but have not found any to be satisfactory for our use, and therefore we are very doubtful as to the lumber which you refer to being satisfactory."

Pruning the Cortland. A Connecticut writer in the Rural New Yorker quotes Prof. A. G. Gulley as saying at a meeting of the Conn. Pom. Soc., 30 years ago, that many people were going to be disappointed in the McIntosh apple. Then came Dr. W. S. Krout and his memorable work in scab control, who first reported on his findings at a Mass. Fruit Growers' Ass'n. meeting in Groton in 1916. His work provided the foundation for effective scab control. The above writer says, "We are facing, in the Cortland variety, a pruning problem similar to the disease problem found in McIntosh 30 years ago. Pruning the Cortland, with its drooping habit of growth takes me nearly 3 times as long as a McIntosh tree of similar size." But if we are not mistaken there are other shortcomings in the Cortland, more serious than its habit of growth.

Nitrogen from the Air. According to a recent report in the Fertilizer Review, there were in 1937 a total of 145 nitrogen fixation plants in the world, an increase of 32 since 1931. The total annual output of these factories is 3,700,000



tons. Germany leads in nitrogen output with 1,300,000 tons followed in order by Japan, U. S., France, England, Belgium, etc. One or more plants are to be found in 24 different countries.

U. S. Low in per Acre Use of Nitrogen. The U. S. Tariff Commission reports the nitrogen consumption in Europe and the U. S. as follows (The figures represent pounds per acre of crop and pasture land): Belgium - 26.3, Netherlands - 23.9, Germany - 13.6, Denmark - 9.6, Norway - 6.6, France - 4.4, Italy - 4.2, Sweden - 3.5, Gt. Britain - 2.9, Czechoslovakia - 2.4, Austria - 1.4, U. S. - 1.1. J. G. Lipman of the N. J. Agr'l. Exp. Sta., estimates a net annual loss of over $6\frac{1}{2}$ million tons of nitrogen from the soils of the U. S. after allowing for more than 300,000 tons applied in the form of fertilizers.

Baker Takes New Radio Job with U.S.D.A. John C. Baker, a former Extension Editor at the State College and more recently in charge of the farm programs of WLS in Chicago, has assumed the role of extension radio specialist with the U.S.D.A. in Washington, according to a recent announcement in the Extension Service Review. In his new position, Baker will assist in the radio programs on the National Farm & Home Hour and will also spend considerable time in the field in connection with local programs.

A Task Well Done. The Federal Surplus Commodities Corporation has purchased a total of 321,410 bushels or 484 cars of apples in Massachusetts during a period of about four weeks following the hurricane, returning to the growers a total of about \$225,000. To facilitate loading, cars were placed at 42 different sidings in 9 counties. Purchases from other N. E. states through the Concord office brought the total number of carloads up to 525, New Hampshire contributing 27, Maine 10 and Vermont 4. Mr. Engels and his co-workers are to be congratulated on their efficiency in handling a big job.

Must All Drop Apples be Picked Up? Valuable time is often wasted in gathering up drop apples long after they cease to be a menace. At this season, about the only excuse for further attention to drops is to eliminate them as feed for mice thereby making a poison bait more effective. Mice certainly will not be as interested in pieces of apples containing zinc phosphide if they can find a supply of untreated apples nearby. From the standpoint of insects and diseases, however, there is no evidence to show that a late fall cleanup of drops is worth the time involved. So long as the drops contain larvae of the apple maggot, there is, of course, no question about the proper procedure. With that insect, the prompt destruction of drops of early and fall varieties is of greater importance than hard, winter varieties.

1938 an Apple Maggot Year. More than the usual number of "railready" apples were apparently found in Massachusetts this fall. Light to moderate infestations were reported in many orchards, some of which have been relatively free from maggot for several years past. Inspections in connection with the federal apple purchase program revealed more infested apples than was anticipated. The explanation may be twofold: First, a natural upward trend in the cycle so common in the insect world, and second, the usual effect following a season of low prices for early apples. With a poor apple market in 1937, more than the usual proportion of apples were left unharvested. This resulted in more maggots entering the ground and a larger fly population in 1938.

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Mouse Control Now or Girdled Trees Next Spring. The stage is apparently set for plenty of mouse injury in Massachusetts orchards this winter. There is an unusually heavy infestation of meadow mice, and in many orchards, trunk and root conditions are highly favorable for mouse activity. Tilted trees afford a natural home for mice around the loosened trunk and roots. Numerous cases of girdling have already been reported. This is the ideal time for exposing poisoned bait in the "runs" thereby insuring against ruined trees at very small cost. Growers who have not yet obtained a supply of the new bait prepared by the Biological Survey should contact their county agricultural agent at once or communicate directly with W. W. Dykstra, 410 Federal Building, Worcester, Mass.

Trapping Rats and Mice. Timely suggestions on the placing and baiting of traps for rats and mice are contained in a leaflet recently prepared by W.W.Dykstra 410 Federal Building, Worcester. A copy may be obtained on request. Baited traps are more effective for mice than rats although the latter may often be caught by properly placing an unbaited trap as outlined in the above leaflet.

Mass. Farmers Using More Lime. A survey of soil conservation practices in 1937, on 250 Massachusetts farms (about 3% of the total enrolled), made by S.R. Parker, shows an increase of 49% in the amount of lime used as compared with the previous 3 years' average. The use of superphosphate showed an increase of 40% and of potash, 36%. Acres of cover crops increased 72%. The adoption of these various practices together on any farm suggest the truth of the old Flemish rhyme: "Lime and lime without manure, Make both farm and farmer poor, But lime, manure, and vigorous clover, Make the old farm smile all over."

There're Working On It. U. of S. Cal. workers find that certain chemicals in onions and garlic which bring tears to the eyes have germ killing powers which may be useful in fighting disease. And now comes word from England that the cow may be "short circuited," as research workers perfect a new method of making cheese directly from grass.

W. H. Thies
Extension Horticulturist

New Roots for Hurricane-Damaged Trees

Roots of blown-over trees which were put back into the ground before they dried seriously started a new root system promptly, and these new roots are growing at the present time. They will continue to grow slowly during much of the winter if the soil about them is not actually frozen. The tendency, however, is toward the formation of thick bunches of fibrous roots rather than heavier roots that would reach out rapidly to replace the extensive root system lost. Young nursery trees, on the other hand, push out their main roots with surprising rapidity. When the trees are growing well they will extend their roots two feet or more per year.

While past experience with blown-over trees is limited, it would seem sound to expect more rapid recovery of a bearing tree if nursery trees or seedlings were planted on the damaged side and inarched into the trunk above. From one nursery tree, for a small trunk, to three or even four, for a large trunk, would seem to be all that could be done in that direction. Large trees will need help more than small ones and even one nursery tree inarched into a large trunk should be of material help. One-year-old whips probably will graft better and root more readily than larger two-year-olds. If two-year-old trees are used, however, it would seem best to graft several branches into the trunk to distribute the food supply somewhat from the start.

Inarched trees grow most rapidly when they stand almost parallel with the trunk. The advantage of planting them far from the trunk and covering them to develop scion roots along the buried whip, is doubtful, for such trees do not get off to as good a start as trees planted vertically. The aim is to get a strong outward development of main roots rather than a lot of fine roots near the trunk.

The best time to do inarching is early spring, as soon as the bark begins to peel. This is some time before the buds start. The inlay method of grafting probably is best. (See Extension Leaflet 117, free upon application to your County Agent or the State College.)

R. A. Van Meter

The Next Orchard

It is not hard to keep a fruit tree alive and reasonably thrifty. The real job is to get ^{large} annual crops of fruit. Orchards have been planted on all conceivable types of soil in Massachusetts -- clay, sand of all descriptions, gravel, and combinations of these, soils underlain by ledge, soils badly water logged, yes, everything from stone quarries to cranberry bogs. Naturally, the infant mortality of trees is high and that means good business for the nurseryman. But the real problem for the would-be fruit grower is the

"loafer" tree hovering on the edge of production and never receiving the care which a respectable tree demands, because it doesn't seem to be worth it. A marginal orchard to begin with, because the owner happened to plant the trees on the wrong side of the road. Or perhaps he picked the wrong site, and as a result, frost damage is frequent.

There are in Massachusetts many blocks of trees which suffer frost injury around blossoming time, in at least one year out of three, just because the cold air doesn't have a chance to slide off to a lower level. A poor site often means an "in and out orchard," with a crop in big crop years, only, when everybody has apples to sell. Air drainage and water drainage go hand in hand to insure larger annual yields of fruit. Absolute elevation above sea level is generally less important than the elevation with respect to adjacent areas. And the direction of slope is not a critical factor although a slope of more than 8 or 10% tends to increase production costs.

This brings us to the question of locating the next orchard. More trees should be planted next spring on real fruit farms to replace recent losses and to maintain a young orchard enterprise. We seem to have too many blocks of trees in the 20 to 30-year group. New plantings may well be started by forward looking fruit growers to replace these older trees as they pass their prime. We can better maintain a reputation for our product from young trees than from the ones that Dad planted. But let's make sure that we pick the best soil and site on the farm and if there isn't a suitable location at home we ought to know it before the trees are planted.

Your county agricultural agent can help you interpret the soils map and advise on the adaptability of your various soil types. The next orchard should be planted on a deep, well drained soil of good water holding capacity where spring frosts are few and far between.

"True to Name" Fruit Trees

The usual examination of nursery trees for trueness to name was made during August and September by Shaw, French, Roberts, and Southwick of the Department of Pomology staff. While the number of misnamed trees found was smaller than in the early years of this work, there are still plenty of them especially among sweet cherries and peaches. The identification of varieties of these fruits is still a difficult problem and a nursery containing about 40 varieties of cherries and 60 varieties of peaches has been budded to give a better opportunity to study them. A few thousand trees were certified for the Massachusetts Fruit Growers' Association and a label attached to each tree.

Eighteen nurseries north and east from Virginia and Michigan were examined. A list of these will be sent to any interested person who addresses a request to the Department of Pomology, Massachusetts State College, Amherst, Mass.

J. K. Shaw

A Critical Time in Mouse Control

The following timely message comes from W. W. Dykstra, Biological Survey Agent in Worcester: "The recent snowstorm has caught a lot of orchardists before they had the opportunity to complete their mouse control work this fall.

The first of these is the fact that the population of the United States is increasing rapidly. This is due to a number of factors, including a high birth rate, a low death rate, and a large influx of immigrants from foreign countries.

Secondly, the United States is a country of great natural resources. It has a large area of land, a rich supply of minerals, and a vast coastline. These resources have been a major factor in the country's economic growth and development.

Thirdly, the United States is a country of great scientific and technological achievement. It has been at the forefront of many of the most important discoveries and inventions of the modern world, including the airplane, the automobile, and the computer.

Finally, the United States is a country of great cultural diversity. It is home to people from many different backgrounds and ethnicities, and this has contributed to its rich and varied cultural life.

THE UNITED STATES AND THE WORLD

The United States has a long and proud history of leadership in the world. It has been a major force in the development of the modern world, and it continues to play a leading role in international affairs today.

One of the most important of these roles is that of a global leader in the field of human rights. The United States has been a strong advocate for the rights of all people, and it has played a key role in the development of international human rights law.

THE UNITED STATES AND THE FUTURE

As the world continues to change, the United States must continue to adapt and evolve. It must remain a country of innovation and leadership, and it must continue to play a leading role in the world.

The following modifications in control are recommended for these individuals.

"If snow and freezing weather continues, use a grain (steam crushed) or rolled oats bait. Apple bait drops in acceptance after snow is on the ground. It is easiest to use ordinary uncooked breakfast rolled oats to which a small amount of bacon grease or light grade mineral oil has been added. The oil will make poison stick and will keep the baits in better condition, but don't use too much. Sprinkle the rodenticide over this mixture and stir until the bait is uniformly light gray in color. Don't use too much poison.

"Just before the snow has all melted (down to an inch or two) is the best time for orchardists to check mouse activity. Fresh trails and air holes will readily stand out. Teaspoon quantities of the grain bait should be placed in these trails, air holes and at the bases of trees where activity is noticed.

"Early damage is already extensive and there are heavy mouse populations in all sections of the state. It is therefore important to stress control work at every opportunity."

Insecticides for Control of Oriental Fruit Moth

Recent tests with insecticides for control of the Oriental Fruit Moth in several of the peach-growing states, have shown some promise. In Illinois, best results thus far have been secured from the use of an oil-dust. Such a dust has given as high as 60 to 80% control when properly applied. To get good control it is necessary that the trees be thoroughly dusted and that application be timely. Best results have been secured by 4 applications at 5-day intervals beginning approximately 3 weeks before harvest.

The formula which has proved most effective is sulfur 60%, talc 35%, and oil 5% (figured on a weight basis). The ingredients must be thoroughly mixed in a dust mixer. Simply stirring the materials together will not make a satisfactory oil-dust. Lime-oil sprays have not proved as satisfactory as dusts, and when sulfur is used during the same period, a black, gummy deposit is left on the surface of the fruit.

Definite recommendations cannot be made for Massachusetts growers until the above dust materials have been tested under our conditions.

A. I. Bourne

A Fertilizer Program for 1939

What should be used for orchard fertilizers in 1939? The only general rule is that there is no one fertilizer formula that is best and most economical for all orchards. A second rule that usually applies is that nitrogen is needed especially in sod orchards. In our orchards at the College we are satisfied that long continued liberal applications of nitrogen are not as effective as could be wished. Potash must sooner or later be added to the nitrogen. How generally this is true in other orchards we have no means of knowing. We have as yet no convincing evidence that the addition of phosphorus is beneficial to the tree although it does aid the growth of grass and cover crops. If your trees are growing and bearing well, continue as you have in the past. If growth is poor and foliage scanty small and yellowish, use more nitrogen, up to 10 or

15 lbs. of nitrate of soda or its equivalent per tree. If the foliage is not at all yellowish, but scanty because of too many buds, especially those on the lower part of last year's growth, add potash to the nitrogen you have been using. The use of a complete fertilizer for orchard trees is to be looked upon as insurance rather than as an assured profitable practice. Why not try it on part of your orchard in comparison with nitrogen, or in comparison with nitrogen and potash, and thus determine which of the three gives superior crops?

J. K. Shaw

This and That

The World's Largest Apple Pie

It was an old stunt but a novel one, and Wenatchee's "Biggest Apple Pie" won nation-wide publicity for Northwest apples. Conceived by a business man's group, baking the monstrous pie quickly grew into a community project, and when it was at last drawn steaming from the huge out-door oven in a Wenatchee city park, nearly 4,000 people gathered round for a taste. Millions of others all over the country saw it in the movies, in picture magazines, newspapers and trade journals. The pie contained 41 boxes of apples and weighed one ton. It was drawn from the oven by a Diesel tractor.

Massachusetts Weather Favors Deer

With less than half a normal kill of deer during the hunting season recently closed, Massachusetts apple growers are wondering how much deer damage to orchards may be expected during 1939. Rain, slush and fog made hunting difficult. Hence the small number of deer reported this season.

Last Call for Strawberry Mulch

With the temperature around zero shortly after Thanksgiving, there is some speculation regarding the present condition of unmulched strawberry beds. But there is a hopeful note in that most plantings were protected by a fairly heavy mulch of snow at the time even though no straw, pine needles or other vegetation had been applied. Undoubtedly the snow provided good protection except on the higher, windblown locations. We may not be so lucky during the next cold spell. It is not too late to get returns on a mulching job.

Spraying Influences Time of Leaf Fall

E. P. Christopher, Extension Horticulturist in Rhode Island, reports some interesting observations in the December Fruit Grower. He says, "The recent hurricane showed the danger of a spray program of lime-sulphur throughout the season in apple orchards. McIntosh trees, in a spray study using lime-sulphur throughout the season, lost practically all of their leaves. Those sprayed with Flotation Sulphur hung on to a large proportion of theirs. Trees sprayed with lime-sulphur through calyx followed by Flotation Sulphur or Kolofog lost about half of their leaves."

Different Opinions on Fall Fertilization

In New England fall fertilization of orchards is not recommended because we have seen some evidence of winter injury in trees thus treated. Kansas

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on the other hand, reports very favorable results from this practice. In the December Fruit Grower, G. W. Kinhead says, "Application of commercial fertilizer in late fall or early spring has, in the opinion of many apple growers, given better results than late application or application just before blossom time in the spring." In contrast, a recent letter from M. T. Hilborn of Maine reports considerable injury to apple trees given a fall application of a common nitrogenous fertilizer. All things considered, it seems best for New England fruit growers to play safe and apply nitrogenous fertilizers in early spring, at least until we have further evidence concerning a more suitable time.

A New Water Gun

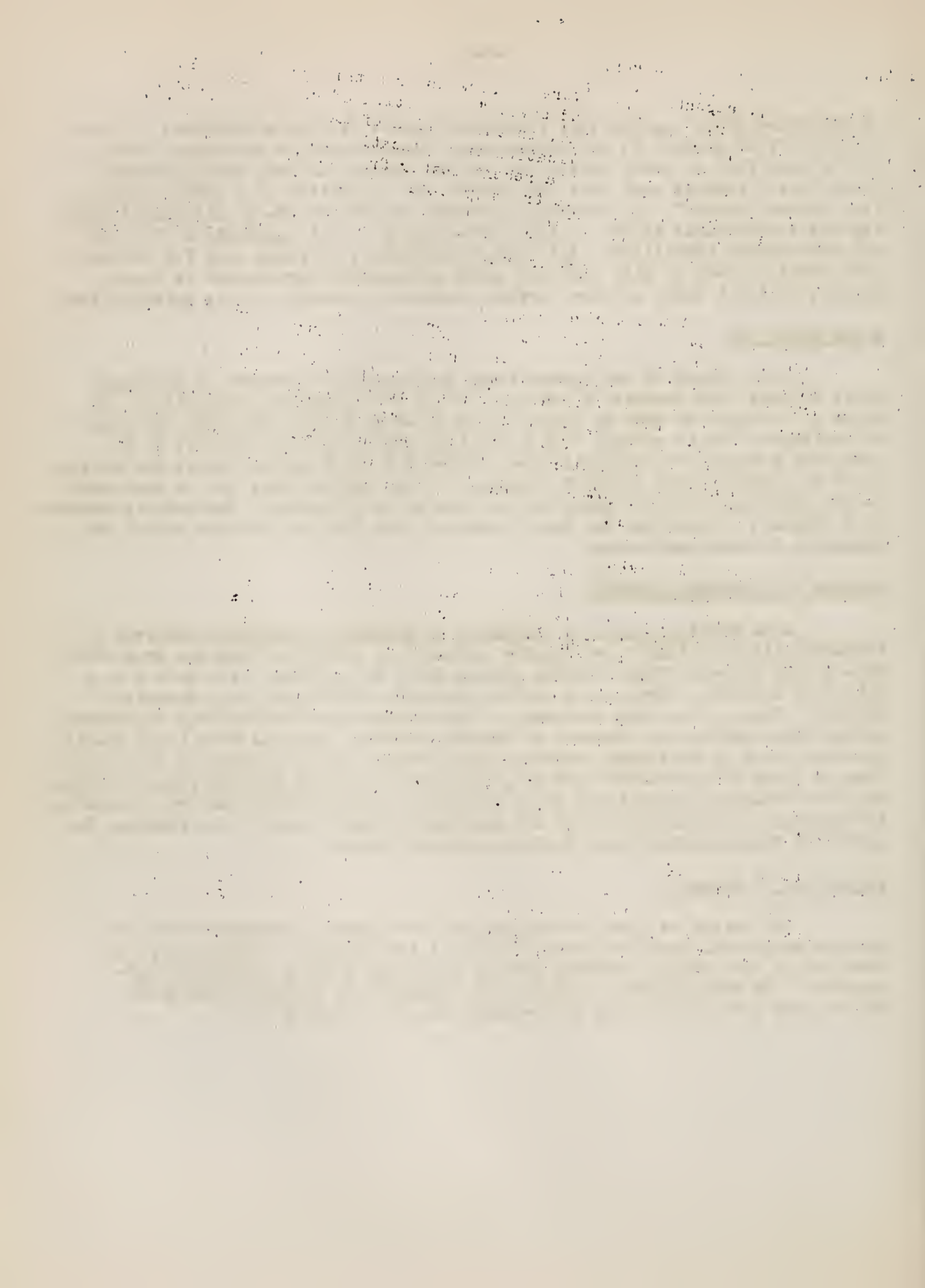
O. E. Robey of the Agricultural Engineering Department at Michigan State College, has invented a new type of gun to be used for irrigation. He hopes to irrigate as much as six or seven acres at a time with this new piece of equipment. He is working with a new type nozzle built to revolve as it irrigates a square or irregular area. Through a motor driven device the nozzle is to be slowed up and elevated slightly so that corners will get as much water as the sides and interior parts of the area to be irrigated. The pump is mounted on a chassis, so that the car motor runs not only the pump but can propel the equipment to unwatered areas.

Striped Vs. Blushed McIntosh

Some striking cases of variation in McIntosh apples were observed in Massachusetts this fall. In a Holden orchard the writer noticed one tree which bore a crop of beautifully blushed apples while an adjoining tree bore a crop which was decidedly striped. A similar observation was made in a Granville orchard. There is so much interest in this matter that the Pomology Department at the State College is planning to assemble budding material from trees bearing blushed apples in different orchards of the state. It is planned to obtain buds from at least 10 sources for use in propagating trees for test purposes. Growers who have observed two distinct types of apples in the orchard and are interested in cooperating in the above test are invited to drop a line to the Pomology Department, Massachusetts State College, Amherst, Mass.

A New Kind of Shower

The writer is just now digging out from under a generous shower of plaster which fell from the office ceiling a few days ago. Fortunately, we were out at the time so suffered nothing more than a badly disrupted headquarters. We mention this to explain the omission of certain items which should have been included in the December issue of Fruit Notes.



FRUIT NOTES - January, 1939

W. H. Thies
Extension Horticulturist

Change in the 1939 Apple Spray Program

Note II in the 1939 Apple Spray Chart reads as follows. "Due to the prevalence of hurricane-weakened trees, the dosage of lime sulfur is reduced this year in order to lessen the amount of spray injury. For the same reason, it is advisable to limit the use of lime sulfur to those varieties most susceptible to scab, for example, McIntosh, Delicious, and Northern Spy; also that lime sulfur be used not more than once in the pre-cover sprays (Pre-Pink, Pink, and Calyx), using a wettable sulphur in the others. Lime sulfur need be used in the Calyx spray only if new scab spots are numerous or if a prolonged rain precedes it within 60 hours. Wettable sulfurs should be used at the dosages recommended by the manufacturer. To be effective they must be applied thoroughly and either ahead of rain or within 24 hours after the rain starts. In orchards with trees in normal condition, the lime sulfur program as indicated may be needed, particularly if the season is favorable for scab development."

The recommended amount of lime sulfur is now $1\frac{1}{2}$ gallons (liquid) or 6 lbs. (dry) in 100 gallons of water. (This note is being included in the present issue of Fruit Notes to urge against overstocking with lime sulfur and to spread the suggestion of a modified schedule in advance of the printed spray chart which will be available soon.)

Preventing Spray Injury in Salvaged Trees

Apple trees partially uprooted by the hurricane will be in a less vigorous condition this year than formerly. It is well known that trees in a weakened, low-vigor condition are decidedly more subject to spray injury on both foliage and fruit than healthy trees. As was brought out in the discussions at the recent M. F. G. A. meetings in Worcester, it is felt that growers will need to observe special precautions this year in order to avoid excessive spray injury. Since greater spray injury is likely to result from the lime-sulfur-lead arsenate combination than from other spray mixtures commonly used, and particularly from early season applications, the question arises as to the replacement of lime-sulfur by a wettable sulfur, and the possible danger of damage from scab and other pests.

In the present emergency, it is believed that growers with injured trees can generally afford to sacrifice some degree of scab control in order to insure a vigorous growth of high-functioning leaves and thus encourage, as much as possible, the recovery of salvaged trees. It is therefore suggested that they plan to use a wettable sulfur program throughout the season, particularly on the less scab-susceptible varieties. At any rate, it will be well to avoid the combined lime-sulfur-lead arsenate spray on any injured trees. Growers who find little or no need for an arsenical in the pre-pink spray, because of the absence of tent caterpillars,

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...and the fact that the system is not yet fully operational, the Commission has decided to postpone the final decision on the system until the end of 1990.

might apply lime-sulfur alone at that time on the more susceptible varieties, but reduce its strength to $1\frac{1}{2}$ gallons of the liquid or 6 pounds of the dry form in 100 gallons.

These suggestions are offered with considerable reluctance, because no small number of Massachusetts growers find it difficult to control apple scab satisfactorily even with the standard, more caustic spray program. For those who plan to use the milder sulfur schedule, too much emphasis cannot be placed upon the importance of observing the greatest care in the matters of correct timing and of thorough coverage. Those who own dusters will find it possible to insure a prompt coverage of the entire orchard either before, during, or immediately after a rainy period. Where dusters are not available, everything possible should be done to shorten the time required for spraying the orchard to 3 days or preferably less, and to spray ahead of rains.

Extra care should be observed also in the application of the delayed dormant spray of oil for red mite lest freezing weather occur before the spray has had time to dry thoroughly. Otherwise the oil may separate and injure the buds and bark, particularly on weakened trees. Some growers no doubt will pass up this application altogether because of the scarcity of red mite eggs. Others may be tempted to do the same even though a moderate or heavy infestation is evident. In such cases, entomologists predict that, if both the oil spray and the lime-sulfur applications are omitted, a dangerous build-up of the red mite population is likely to occur during the summer months particularly if weather conditions should prove favorable for the pest. So the proper step to be taken in this regard must be determined by the grower's good judgment and his knowledge of the red mite situation and the scab hazard in his own orchard.

The use of the mild sulfur program early in the season may result in a build-up of foliage scab about the middle of June. If so, one application of lime-sulfur $1\frac{1}{2}$ -100, without lead arsenate, should burn out the scab spots with little or no danger of appreciable injury to either the leaves or to the set of fruit.

O. C. Boyd.

The Fruit Industry in England

Deciduous fruit growing in England is definitely on the increase. In the light of this fact it is interesting to compare some of the environmental conditions encountered there with those in Massachusetts. The following long-time averages:

	<u>East Malling, England</u>	<u>Amherst, Mass.</u>
Total rainfall (inches)	25.7	43.5
Mean temperature (F°)	49.5	47.2
Total sunshine (hours)	1200	2356

In England the heaviest precipitation occurs during the early winter months, whereas in Massachusetts, July and August are normally the months of greatest precipitation. During 1937 the lowest temperature recorded at East Malling was 24° F. and in 1936, 17° F. At Amherst, corresponding temperatures were 6° F. and -12° F. The highest temperatures for the two years were: 90° and 25° for East Malling and 96° and 98° for Amherst. The greater amount of sunshine gives our apples a finish which is never approached by English apples. In England the most pressing soil mineral

shortage is potassium, whereas in Massachusetts, nitrogen additions are paramount.

Practically all of the more recent plantings of English apples are on clonally propagated rootstocks. This is partially true with other fruits also. In Massachusetts, the use of clonal-rooted trees commercially is practically unknown. Their possible usefulness here is being investigated, however.

The fact that England is the chief importer of American apples makes expansion of the fruit growing industry there of added significance. Despite the recent favorable trade agreements, there is definitely a widespread move to increase English apples for English markets. They sincerely believe that home grown fruit is best, which idea deviates mightily little from our own philosophy here in Massachusetts.

L. Southwick

Mouse Control in Apple Storages

Robert Isaac, Biological Survey Agent in Connecticut, offers this advice to Connecticut growers. For further details, Massachusetts growers may contact W. W. Dykstra, Federal Bldg., Worcester.

The hurricane of September 21 made it necessary for growers to pick up their apples at top speed and to move them to the storages as soon as possible. However, the apples were boxed more speedily than it was possible to get them into the storages, making it necessary to leave boxes of apples in the orchard over-night or even longer. This condition made it possible for the mice to be carried into the storages in large numbers since mice have a habit of getting into the boxes over-night and even establishing their nests in them in as short a period. Considerable damage is done by a few mice in a storage if they are left there any length of time. Where mice have worked on boxes of apples it is necessary to repack and to throw out the damaged fruit. Considerable time and expense is involved.

A simple means of control can eliminate much of this trouble and has been used successfully in a number of storages this year. -- Using boxes about the size of a cigar box, cut holes in each end large enough for the mice to enter. Put a tablespoon full of poisoned oats in each box and place them throughout the storage. Particular attention should be paid to the placement of bait-boxes. The ideal locations are along walls in back of the stored fruit, in dark corners, under the raised floors, between rows of boxes, behind boards placed against the walls to form runways, and in the areas where you know the mice are working. The more stations you use the more effective will be your control.

The oat-bait material should be of a permanent nature to avoid the possibility of its becoming ineffective. The rodenticide used for control in the orchard should not be used unless it can be replaced at least once a month with freshly prepared grain. A permanently prepared oat-bait is available to you by letting your County Agent know of your needs or by writing me direct at the Connecticut Experiment Station in New Haven. Growers are urged to try this means of control to stop mouse damage in storages thereby eliminating another type of loss that helps take the profit out of apple growing.

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The Next Orchard -- Where?

Speaking at a recent meeting of fruit growers in Worcester, A. J. Heinicke made these suggestions about locating the orchard: Avoid frost pockets and extreme exposure to prevailing winds. Choose an elevation above the surrounding country, and if possible, a section where hailstorms are not prevalent. Soil must be well drained if we expect to get good yields. With the same care in fertilization, cultivation and spraying, the yield in a given locality may be increased from 35 to 100% by locating the orchard on a good soil. The soil is related to general vegetative vigor, to the life of the tree, to the set of fruit, and to its size, color, and quality. It is related to the absence of Baldwin Spot and to recovery from winter injury. We should learn definitely what constitutes a good orchard soil and recognize the marginal type. Soil conditions that effect the fruit business are not fixed. They vary from year to year and depend largely on weather conditions, especially rainfall.

First, the soil must serve as a reservoir for water, enough to make the orchard more or less independent of the rainfall which falls during the growing season. Our annual rainfall would be adequate if that which falls during the winter could be stored in the soil. We have few ideal soils. Second, the soil must serve as a source of nutriment, including boron, manganese, iron, copper, zinc, sulfur, etc., and we must expect to supplement what is found in the soil by applying nitrogen, and under certain conditions, other elements. The soil must also serve as a good medium for root growth. The tree must fix itself rather firmly to resist ordinary winds. A good orchard soil, then, must permit the infiltration of a considerable part of the rainfall, to be utilized as required. Infiltration is tied up with slope and the presence of organic matter. It is not always desirable, especially on the more level areas, to have too much of the water getting into the soil, particularly if it cannot filter down to lower depths. If water gets into the surface 6" to 2' but cannot move downward, serious difficulties result. Some of the worst New York soils are those with the surface foot or two rather sandy, and a hardpan beneath. Natural fertility of a soil depends upon the rock from which it was formed. Most of our soils in the East are fairly well supplied with the essential minor elements.

Third, the soil must permit the roots to penetrate and branch rather freely to a depth of four feet or more, and these roots must remain active for a large share of the growing season. Roots never penetrate to a depth below the surface unless at the time they are growing, conditions are favorable, particularly the supply of oxygen. Roots at lower depths are of service to the tree from a nutrition standpoint only if they can pick up water and mineral elements at that level. Water in the soil is of no value whatever to the tree unless roots are present where the soil is moist. The roots must go down to where the water is, and if the roots are to function, the soil must be aerated. Marginal soils are often water-logged during May and early June, when there is a heavy demand for water.

Leaves grow largely as a result of materials stored in the tissues the previous season. But the size the leaves will attain early in spring depends on the moisture supply. The only way the leaf expands is to have more moisture. The plant automatically adjusts itself as regards size of leaves. Nothing causes dropping of flowers more quickly than competition for water between flowers and leaves. If a deficiency occurs, the leaves get

the water and the flowers suffer. Only a few hours of such deficiency are required to cause a heavy June drop. Reduction in crop of orchards on water logged soils often occurs when rainfall in spring is excessively heavy. There may be a root system, but it cannot supply water for the tree, because there is not enough air in the soil.

Normal air contains about 20% oxygen and 80% nitrogen. In good soils we may find 15% or more of oxygen in the air at the four-foot level at this season, while in other soils there may be practically no oxygen at that level even though the supply was satisfactory in September. Soil particles, in swelling may fill up the air spaces, thus excluding the air to a point that the roots can't keep going. It is very important that the oxygen supply throughout the deeper layers be ample just as soon as activity starts in spring. Tree roots must have an air supply containing at least 10% oxygen. If the oxygen supply goes below that level, the roots, while not killed, are unable to pick up what is present in the soil. The surface foot generally has many roots because conditions are most favorable for getting oxygen.

Water in the soil must get up to the fruit during the growing season as rapidly as it is lost from the leaves. This requires a wide contact of roots with moist aerated soil. If the roots are functioning to a depth of only 18" they cannot get as much water as if they were active to a depth of 4'. Apples grow mainly during the night when water may be diverted from the leaves. They shrivel when a deficit occurs. Growth is not resumed until the loss is restored. In some soils the particles have been pressed so firmly by extreme pressure as to appear cemented. This, of course, effects the oxygen supply.

Early spring, after a rather wet winter may be a good time to test a soil for orchard purposes. If the water table remains within two feet of the surface as late as June 1, that soil should be avoided. A good soil will have a water table down to four feet by the first of May. The water level should drop rapidly after the frost is out of the ground. Trees may be submerged from November until April 1 without damage. Not so with trees submerged after growth starts. A good soil will have a fairly uniform color to a depth of four or five feet. A reddish brown color means that air has penetrated and brought about oxidation. Soils which are lighter colored below 18" suggest that there is a lack of oxygen during a part of the year. Roots fail to penetrate a grayish soil to any extent. A mottled condition is bad. It is very hard to lower the water table out of the second or third foot of soil, where roots are being asphyxiated early in the season. Tile drainage is not entirely effective. A soil may be devoid of any free water and still have the air excluded by swollen soil particles. A normal soil may have over 40% of air space. The rest is soil. But if the soil particles swell up, leaving a greatly reduced oxygen supply, it is an unfortunate thing for growing fruit trees.

Items from Here and There

Cortland and Early McIntosh Cross Incompatible

Cross incompatibility, that is the failure of pollen of one variety to be effective on some other variety, is rare in apples. It is well known that it is true of certain varieties of sweet cherries. It is therefore interesting to know that the New Hampshire Station has found that Cortland

and Early McIntosh are cross incompatible. The pollen tubes stop growing when about one-third grown and fertilization fails. Therefore one should not plant these two varieties with the expectation of successful interpollination.

J. K. Shaw

Ethylene Dichloride Emulsion for Peach Borer Control

Cooperative experiments conducted in New York, Georgia and Illinois have shown that ethylene dichloride emulsion has several advantages over paradichlorobenzene, for the control of the peach borer, as follows.

1. It is effective in cool weather--in most of Massachusetts probably any time during October. 2. It is safe on young trees. 3. It can be poured or sprayed with equally good results. 4. It costs a little less than paradichlorobenzene.

Although ethylene dichloride has not been tried at the College, the results obtained elsewhere seem to warrant a trial in Massachusetts.

L. Southwick

Retired Refrigerator Cars for Farm Storage

Refrigerator cars retired from service have been found by growers in Indiana and Michigan to make very acceptable air-and-ice-cooled fruit storages. The costs to a Michigan grower of setting up such a car are interesting. The f. o. b. price was \$175 and the costs incidental to moving the car to the farm amounted to \$57.82. Approximately ten tons of scrap iron brought \$92.93, making the net cost \$139.89. The capacity of this car was 900 apple crates with provision for a maximum of 8600 lbs. of ice for cooling. In 1937, this grower chilled 40 tons of cherries. This enabled him to hold pickings for several days to take advantage of the market. Furthermore, the fruit came out in very satisfactory condition.

Peaches were held from 14 to 20 days and were in prime eating condition when sold. From September 9 to October 5, twenty tons of cake ice had been used to chill and hold for various lengths of time approximately 2500 bushels of peaches. This control of marketing brought much greater net returns, due to "hitting the market".

After the peaches were removed, fall apples were placed in the car and the remaining ice utilized. Throughout the winter, the car was operated successfully as an air-cooled apple storage.

L. Southwick.

Why Spray?

In Washington, it was found that from 14,000 to 159,100 spores of various fungi per apple were present in the air in orchards. Over 108,000,000 spores were averaged on the inside of six boxes. Gloves worn by sorters gave 12,000 to 40,000 spores per square inch of palm. Apples from four important apple growing districts bore 124 species of 29 genera (and 23 unclassified) of which 58 were found capable of causing decay.

L. Southwick.

Freeze vs. Freeze

In recent freezing studies at the Georgia Experiment Station, it has been found that fruits become more solid with decreases in temperature. For instance, at 0°F. a strawberry will stand only about 50 lbs. pressure

whereas at -100°F. the resistance is raised to 100 lbs. The conclusion is drawn that at 0°F. freezing is not complete. L. Southwick.

Peat Moss for the Newly Set Trees

At the Geneva Experiment Station, the value of granulated peat moss incorporated with the soil in the tree hole has been demonstrated, especially during wet years. In dry years, the beneficial effects were much less pronounced. L. Southwick.

Save the Hurricane Trees

H. A. Rollins, Extension Fruit Specialist in Connecticut, points out six needs of the hurricane damaged tree as follows: (1) Guy wires should be kept tight to prevent trees from swaying. (2) Prune moderately because the leaf surface is needed. (3) Fertilize moderately in spring and within the reach of injured roots. (4) Spray with mild sulfurs to avoid burning of foliage. (5) Mulch trees to preserve moisture and water them during a drought. (6) Thin fruit heavily to reduce the demand for food supply.

Grading Versus Degrading

W. E. Piper gives us this enlightening observation from the Boston Market. "It's nothing new for peddlers and others to mix some Fancy apples with some ordinary ones 'to sweeten them up.' But the extremes to which this is carried sometimes give you a jolt. 'That fellow puts up a nice apple,' remarked a buyer the other morning, 'a slick Fancy pack and a good B grade.' 'Which do you take?' we asked. 'Oh, me,' he replied, 'I buy about half and half Fancys and B grades and then I mix 'em myself.' Now this is not offered as an argument against grading. Certainly the bulk of this particular line of fruit sells well because it is graded. But just as it takes all kinds of people to make a world, so it takes all kinds of buyers to make a market. In this particular case it certainly is a pity that the work of grading this nice mark of apples has to be undone at the other end of the line by this mixing or degrading of the fruit."

The Test Tube and Soil Fertility

The merits of soil testing have been debated for more than a century. In 1813, Sir Humphrey Davy wrote in his "Elements of Agricultural Chemistry" as follows: "If the land be unproductive and a system of ameliorating it is to be attempted, the sure method of obtaining the object is by determining the cause of its sterility, which must necessarily depend upon some defect in the constitution of the soil, which may be easily discovered by chemical analysis." Fifty two years later, Dr. August Voelcker said, "There was a time when I thought, with many other young chemists, that soil analyses would do everything for the farmer. Three or four years of further experience and hard study rather inclined me to side with those men who consider that they are of no practical utility whatever. And now after 18 years of continued occupation with chemico-agricultural pursuits, and I trust with more matured judgment, I have come to the conclusion that there is hardly any subject so full of practical interest to the farmer as that of the chemistry of soils. The longer and more minutely soil investigations are carried on by competent men, the greater, I am convinced will be their practical utility." Then in the first quarter of the 20th century there developed a mania

for long time field experiments. The value and the limitations of both soil tests and of field experiments are today well recognized. Dr. Emil Truog says, "It is the duty of all agronomists to preach the doctrine that the major plant nutrients removed from the soil by crops must be returned, pound for pound, in the form of crop residues, animal manure, or commercial fertilizers if soil fertility is to be maintained".

Should the Fruit Keeper Keep Bees?

Mid-winter may be a little early for bee activity but not too early to be thinking about blossoming time and the important role of the busy bee. I doubt if even a quarter of the fruit growers will ever become expert beekeepers. Maybe it's because they've had the experience of getting stung in other ways. But something like 99% of our fruit growers are convinced that good yields are associated with bee activity at blossoming time. Of course, if we could bank on having two or three days of warm weather when both wild bees and honey bees fly for long distances, we'd quit worrying about getting pollination in our individual orchard. Even a solid 10-acre block of McIntosh might set a full crop under those conditions. Provision for cross pollination is largely a matter of insurance to take care of the season with a few rainy days during bloom, and with bee flight limited to a few hours. Here is where a tree of good pollinating variety next to every McIntosh, and a strong colony of bees per acre are most likely to pay dividends. The grower should first of all provide the variety arrangement to take care of the unusual season. And if he doesn't care to master the details of handling bees himself, then he should make such arrangements as will insure plenty of bees in the orchard itself. We need even closer cooperation between beekeepers and fruit growers in Massachusetts.

A Mouse Check Up

President John E. Rice of the M. F. G. A. reports an interesting observation in his orchard in Marlboro. In going through the orchard after the new zinc phosphide bait had been distributed, plenty of mouse runs were still to be seen in the snow. This made it appear that the bait was ineffective. A hurried call to W. W. Dykstra in Worcester and a check up of the mice in the orchard revealed this interesting fact. The mice responsible for making the runs were not the kind of mice that damage orchard trees, and were not apparently interested in the poison bait. A check up of this kind in every orchard where mice are present may save trouble and expense of bridge grafting later on.

In the February Issue

In the next issue of fruit notes a resume of another of the interesting talks at the recent M. F. G. A. meetings, will be included. We shall also include some echoes from the Rochester meetings of the New York State Horticultural Society.

W. H. Thies
Extension Horticulturist

Planting Orchards in Massachusetts

The average rainfall in Massachusetts is about 43 inches. This is more than the important competing apple regions get. We get our heaviest precipitation in July and August when we need it most. Our climate gives a finish to apples that has long been famous, and its very severity holds insects like codling moth in check to such an extent that we have less trouble with them than any important competing section.

In the past 10 years Virginia has averaged about 45% of a crop each year. New York has averaged 53%, New England 63%, and the Northwest about 70%. The Northwest stands highest in average % of a crop and New England comes next. The dependable cropping of New England orchards is a real advantage. We are rapidly becoming a one-variety section and that is a disadvantage. McIntosh is the most popular apple on the market and we would not trade it for any or all the others grown elsewhere, but we do need a good, high quality variety to grow with it. McIntosh probably is the most difficult apple to handle that is grown anywhere and we still have much to learn about placing it on the market in good condition.

We have some excellent orchard sites and soils, many of which are not now utilized for orcharding. Recent studies of the relation of subsoils to root development have added much to our knowledge of what soils to select.

Here in the Northeast we have a densely populated area characterized by a high concentration of wealth. This makes the best market on the continent. Its nearness makes marketing costs very low and affords advantages that many sections can never offset. This is all reflected in the average per bushel price received by Massachusetts growers. The following table will make this clear.

	Average Farm Price Paid for Apples			
	1934	1935	1936	1937
Massachusetts	\$1.26	\$1.02	\$1.35	\$0.90
Virginia, etc.	.89	.72	.99	.60
Northwest	.73	.60	.96	.69
United States	.88	.71	1.05	.70

The decline in the per capita consumption of apples is not necessarily a calamity for the apple grower. The per capita consumption is arrived at by dividing the total crop (150,000,000 bu.) by the population (125,000,000) to get the average consumed by each individual (1 1/5 bu.). This is lower than it was a few years ago--not because people refuse to eat apples for they eat all you grow, but because fewer apples are produced. Why are fewer apples produced? Cold winters have destroyed millions of apple trees; increasing difficulties in controlling pests have driven many thousands of small orchards out of business, and commercial orchards have not been planted fast enough to take up the slack. Prices have not been high enough to encourage large-scale planting--that is where the decline in consumption operates.

People have not turned away from apples. In the last 5 years they have eaten 3 times as many apples as oranges and 6 times as many apples as grapefruit. If we do plant more orchards in New England we shall not wreck the market, for prices are affected by the supply of all fruits in the country. We grow but about 5% of the total apple crop. The last census showed about 6,000,000 apple trees in New England. If all these trees lived 50 years we would have to plant 120,000 more trees per year in New England in order to maintain the number of trees. We haven't been doing that. The man who knows his business should plant in the right places making a careful choice of varieties and plant acreage enough to give him a satisfactory living. There is still a chance for apple growing in New England as a sound conservative industry.

R. A. Van Meter

Law Concerning Neglected Trees and Shrubs

Although not necessarily a pacifist, the fruit grower is likely to be a peace loving individual. Often he tolerates in silence a source of pest infestation on neighboring property rather than "start a fuss" with a neighbor. Occasionally someone asks, "What can I do about a neighbor's orchard which receives no attention at all and breeds maggot flies and other pests?" Or he may say, "There ought to be a law." Well, there is a law, in case anybody wants to use it. This matter was mentioned at a recent M.F.G.A. meeting in Worcester by President John E. Rice. So we have asked Mr. Rice to tell us all we need to know about it. He has given us a copy of the law in full, along with his interpretation.

General Laws of Massachusetts, Chapter 128

Sec. 24. Inspection of Orchards, etc. Procedure if Infested.

The director, either personally or through his assistants, may inspect any orchard, field, garden, roadside or other place where trees, shrubs or other plants exist, whether on public or private property, which he may know or have reason to suspect is infested with the San Jose' scale or any serious insect pests or plant disease, when in his judgment such pests or disease are likely to cause loss to adjoining owners, and may serve upon the owner, occupant or person in charge of trees, shrubs or other plants thus infested, written notice of the presence of such pests or plant disease, with a statement that they constitute a public nuisance, together with directions to abate the same, giving the methods of treatment for the abatement thereof, and stating a time within which the nuisance must be abated in accordance with the methods given therein. If the person so notified refuses or neglects so to treat or destroy such trees, shrubs or other plants within the time prescribed, the director may cause such property to be so treated or destroyed, and may employ all necessary assistants for this purpose, who may enter upon any public or private property, if such entry is necessary for this purpose. Upon the completion of said treatment the director shall certify in writing to the owner or person in charge of the treated property the amount of the cost of such treatment, and if this be not paid to the commissioner within ninety days thereafter, the same may be recovered by suit, together with the cost of the suit.

Sec. 25. Appeal from Proposed Action under Sections 16-31.

In case of objection to the proposed action of the director or his assistants in executing any provision of sections sixteen to thirty-one, inclusive, an appeal in writing may be taken within ten days to the commissioner, and the appeal shall operate as a stay of proceedings until it has been heard and decided by the commissioner, whose decision shall be final.

Sec. 29 says that whoever violates Sections 16 to 27 inclusive or offers hindrance, and after written notice from the director refuses or neglects to comply with any of the sections shall be punished by fine. And in Sec. 25 it should be noted that the owner of trees against whom complaint has been made may

appeal from the Director's report within ten days in writing to the Commissioner of Agriculture, whose decision is final.

Fortunately, most of the cases of pest menace on adjoining property may be cleared up by direct cooperation between the owners concerned. And, of course, no real fruit grower would think of complaining until he himself has done a thorough job of house cleaning at home. The above law was not intended to apply where neither of the parties are making a real effort to grow clean fruit. But if legal help should be needed to clear up the occasional flagrant menace, there is, in the words of Mr. Rice, "plenty of law to control the situation." The orchardist may write to the Director of the Division of Plant Pest Control or to the Commissioner of Agriculture setting forth his complaint, and if investigation sustains the complaint the owner of the menace will remedy the situation or have it cleaned up at his own expense.

Root Injury and Recovery

Speaking at a recent meeting of fruit growers in Worcester, A. J. Heinicke made these statements about the roots of a tree: We know considerably more about the tops of trees than about their roots. If the top is injured or pruned heavily, we get a lot of sucker growth. What goes on below the surface of the ground is less well known. Only occasionally do we have a chance to learn what the tree is doing below ground. The tree shows a marked ability to adjust itself to adverse circumstances. Fortunately, it remains more or less passive to many of the things that we do to it. Sooner or later the tree tends to adjust itself and bring about a balance.

There is a marked interdependence between the root system and the top. The top depends upon the roots for its water and its nutrient elements necessary for proper functioning of the leaves. A tree does not necessarily take up nutrients in proportion to the water it takes up. The amount of water varies largely from day to day, depending upon how much is lost. Just because we have tremendous losses of water one day does not mean the tree is taking in large amounts of nutrient elements at the same time. We have here two separate functions; the one of taking up water is largely to replenish that which is lost, as for example, by evaporation. The balance between top and root system is never a definitely fixed thing. The ratio may fluctuate rather widely.

The importance of water is quite obvious. Succulent portions of a tree are 60 to 80% water. Water is particularly important early in the season when there is expansion of these new tissues. Unless we have proper expansion of the cells they simply mature and remain more or less fixed. We need an excess of water during the growing period to expand the tissues and thereby promote shoot and leaf growth. Later in the season the only portion of the top making any considerable growth is the fruit, and that is subject to wide variation, depending largely upon water pressure or turgidity. It is important that we have large masses of roots in contact with moist soil.

In an uprooted tree we see mainly the conducting and storage tissues of the root system. The very active portions, the root hairs, are very short lived lasting for only a few days or weeks at a time. They are constantly being replenished. The top of a tree, if unpruned, tends to prune itself. In much the same way we may find parts of the root system being eliminated naturally. Roots as large as 1 or 2 inches in diameter may sometimes be found dead, and if a root

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry must be supported by a valid receipt or invoice. The second part outlines the procedures for handling discrepancies between the books and the actual cash on hand. It states that any variance must be investigated immediately and reported to the management. The third part provides a detailed description of the accounting system used, including the chart of accounts and the methods of recording transactions. The fourth part discusses the role of the accounting department in providing financial information to management for decision-making purposes. The fifth part concludes with a statement of the department's commitment to accuracy and transparency in all financial reporting.

The following table shows the results of the audit for the year ended December 31, 1999. The table is organized by department and lists the various accounts audited. The results show that the majority of accounts were found to be in compliance with the company's policies and procedures. However, there were a few instances of non-compliance, which have been identified and are being addressed. The audit also identified several areas for improvement, which will be implemented in the coming year. The overall conclusion of the audit is that the financial records are reliable and that the accounting system is effective.

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is girdled entirely, anything beyond the girdle is incapable of regeneration. The cambium layer is, of course, as necessary in the growth of a root as in the growth of a branch. Roots grow in diameter by laying down new wood just beneath the cambium layer.

In the case of the top, replacement of branches comes largely from pre-existing growing points, or buds. These buds may remain dormant for years. In the case of roots, new portions of the root system may arise from almost anywhere in the older parts of the roots. We do not have to have any definite buds. These "adventitious buds" are found almost anywhere in the root system. But if we cut off a root within two or three feet of the trunk there is a tendency for a number of new roots to start at that point. Such roots appear fibrous at first as in the case of a root-pruned nursery tree, but it does not take very long for some of these fibrous roots to turn into anchorage roots and thus provide a stabilizing influence for the tree. Roots may grow out for several feet in a single season.

The "food" required for root growth is not, of course, the fertilizer you place on the soil. This fertilizer is nothing more than the nutrient elements which must be taken into the tree and assimilated, thus building up real nutrients for the cells and for the energy necessary in the functioning of leaves. We never apply any plant food to the soil. We merely apply the nutrient elements. The bulk of the food is manufactured in the leaves. The root system cannot make any growth unless it has this manufactured food material. This gives us an important lead in pruning.

It has been demonstrated time and again that if we prune the tops of trees very heavily we reduce the total weight of the tree as compared with a similar tree which has been left unpruned. If a tree is heavily pruned, it takes many weeks before the leaf area removed in pruning, is restored. Thus, the tree must get along with less food. When we prune heavily we reduce the weight of the root system much more than we do the weight of the top. This is due to the competition for food materials. Food manufactured in the leaves is utilized largely in the vicinity where there is an active demand for it. If we have an active shoot growth early in the spring the food manufactured by the leaves is taken away from the roots and used in growing more shoots. Also, if there is a crop of fruit, a good share of the food manufactured by the leaves is used in fruit development. There is relatively little increase in the weight of the root system early in the spring. Roots do not grow until most of the top growth is completed.

In mature trees most of the new twigs, etc., have been laid down by the first of June. After that we get the bulk of the root activity. The recovery of the root system of hurricane damaged trees is going to depend on getting a good supply of food down to the root system as rapidly as possible. Competition between top and root must be reduced. That means, first of all, that we must avoid over-stimulating the top. We must not use too much nitrogen. An abundance of nitrogen early in the spring tends to utilize carbohydrate material in top growth. Later in the season, of course, we may cash in on this larger leaf area. But in our particular situation at the present time, if we force a lot of top growth we are depriving the root system of food for a longer period. We are anxious to get food down to the roots just as soon as we can. We must therefore avoid over stimulating the top and also avoid unusually heavy pruning. Heavy pruning tends to remove a lot of leaf area which might be present as early as

the middle of May. Furthermore, that makes it necessary for the tree to build up new leaf area and as long as it is building new leaf area it is using what little food it has to make more leaves. In the meantime the root system is not getting the benefit of the food as early as it should.

The opening of buds and the size of leaves this spring depends very largely upon the food put back into the tree in 1938. The amount of water is also an important factor. If we have a hot, dry spell the leaves will tend to be smaller simply because they will not have quite so much water pressure to expand them. Do we want a large leaf area early in the spring? A moderate leaf area seems more desirable in order that the reduced root system will still be able to supply the necessary water. If we force the tree to develop a heavy leaf area, there will be a larger loss of water through the leaves and the tree is thus less able to withstand hot, dry weather in early summer. We must give the tree an opportunity to adjust itself. A somewhat smaller early leaf area may be an advantage, since we do not have enough root system to supply water for an abnormally large leaf area.

The hurricane came the latter part of September. The ground was fairly moist so we had little trouble in getting many of the trees back in an upright position. Much of the foliage remained for a month after the damage occurred. That was a favorable circumstance from the standpoint of recovery. With the fruit removed, whatever food remained could be distributed to the root system. This will provide material for a root growth early in the spring even before there is any considerable amount of growth in the top. If the fruits had remained on the tree they would have taken a good share of the food material.

There is one critical period in the recovery of these damaged trees. It is to be hoped that we do not have cloudy weather and a lot of rain early in the growing season. The more favorable the growing conditions after the first of June the better. Trees will still be subject to blowing over next spring while the ground is soft. We must therefore anchor them securely. The difficulties should be largely over at the end of the first growing season.

In conclusion, these trees that have suffered may last for 200 years, but they are never going to be the same. They may furnish a few bushels of fruit for a long time, but for the future of the industry we must make up our minds that "here is the time to start planting an orchard or to replace this one." We in New York have made the mistake for a good many years of not replacing our old trees, and almost everyone regards the recent severe winter as a blessing because we noticed our trees growing older and getting weaker. A thing of this kind will emphasize the need for keeping up the supply of young trees. We do not have to be young in order to set out a young orchard. Trees have a very remarkable range of adjustment and if we have favorable soil conditions, favorable varieties, we may look for a good many crops as long as we treat our trees well. The main thing is not to push the trees too fast the first year and not to prune too heavily.

Service in Locating a New Orchard

Soil conditions 3 or 4 feet below the surface are generally of more importance from the standpoint of future profits than the conditions we can see on the surface. It is fairly easy to modify the surface soil. But we can't do much, if anything, about the subsoil. So it is important that we know the fitness of a prospective site before the trees are set. To give practical assist-

ance along that line this spring, the Extension Service will welcome an opportunity to pass judgment on any site in which a grower is interested. A few requests of this nature have already come in. A telephone call to the county office will provide a rating of site and soil at the earliest opportunity. Not long ago we learned of the recent planting of one fairly large commercial orchard on one of the poorest soil types in the Northeast. A few holes dug here and there to reveal internal drainage and aeration, or even a look at a Soils Map will go a long way toward avoiding such permanent mistakes. A rather thorough study of the soil types in Massachusetts provides the basic information for evaluating your prospective location. It may be either better or worse than the other side of the hill.

Consumer Variety Preferences

W. E. Piper submits this story in the latest Apple Market Report. "Interesting evidence of the consumer popularity of McIntosh is revealed in a check-up of variety preference as a part of a retail apple market study conducted by Phillip B. Shiff under the supervision of the State Extension Service. Retailers were asked to state what varieties were preferred. The number of times each variety was given first choice, second choice, etc., is reported as follows.

	<u>First choice</u>	<u>Second choice</u>	<u>Third choice</u>	<u>Fourth choice</u>	<u>Fifth choice</u>	<u>Total times mentioned</u>
McIntosh	100	9	4	-	-	113
Baldwin	12	79	8	-	-	99
Delicious	1	4	15	4	1	25
Winesap	-	1	19	2	-	22
Northern Spy	-	4	9	1	-	14
R. I. Greening	-	4	8	-	-	12
Gravenstein	-	2	5	-	-	7
Wealthy	-	1	2	-	-	3
Russet	-	-	-	2	1	3
Rome Beauty	-	-	2	-	-	2
Duchess (Oldenburg)	-	-	1	1	-	2
Esop. Spitzenburg	-	-	-	2	-	2
Total	113	104	73	12	2	304

The above figures apply to those consumers who mentioned any variety. That there is still much room for consumer education is shown by the fact that only 47% of the apple consumers ask for apples by variety name. Most of the remaining 53% ask for either "cooking" or "eating" apples. A few simply ask for "apples." Of the people who buy apples at chain stores, 51% specify the variety desired, of those who purchase from independent stores, 49% specify varieties. Patrons of medium and high class stores specify variety in 51% of their apple purchases, but patrons of low class stores specify variety in only 34% of their purchases. The practice of asking for a specific variety is more prevalent in the Boston area than in any other region of the state. In this area, 54% of the apple consumers ask for apples by variety, in the western Massachusetts area, 51%, and in the Cape area, 39%."

Items From Here and There

Avoiding Bark Injury. Bark injury to McIntosh tree trunks may be avoided by top working on hardy stocks. However, one should not expect a hardier top.

In the mid-west, Virginia Beauty and Hibernial have been successfully used to promote trunk hardiness and these varieties seem to be suitable stocks for McIntosh. Any grower who thinks the extra trouble worth while can buy these varieties, set them in his orchard and top work them to McIntosh at the proper time. J. K. Shaw

Apple Silage. In Bulletin No. 362 of the Washington Experiment Station at Pullman are reported experiments demonstrating that cull apples can be used as dairy feed by ensiling them with alfalfa hay in the proportion of 80 percent apples to 20 percent alfalfa hay.

No Potash Deficiency. In a report from Michigan (Quarterly Bulletin for November, 1938) concerning the potassium situation in Michigan orchard soils, the statement is made that potash is not as yet "a limiting factor in tree fruit production" in that state.

A New Grafting Wax. In a test of grafting waxes and other proprietary materials, it was concluded in Michigan that several commercial trade preparations could not "be recommended." Certain modifications of the standard home-made formula seem particularly promising. One of the best of these has the following ingredients: Resin - 5 pounds, Beeswax - 1 pound, Raw Linseed Oil - 1/2 pint, Fuller's Earth - 1/2 pound. Lawrence Southwick.

A Breezy Note. A few days ago we had a chance to look over an old diary written by the great, great grandfather of W. H. Taylor, a fruit grower in North Middleboro. On a certain date in 1815 there appeared a clearly written reference to a hurricane which had just swept New England. This was the storm which, according to reliable reports, uprooted the original Baldwin apple tree in the town of Wilmington, Massachusetts.

Kansas Uses Refrigerator Car Storage. The following message was just received from W. G. Amstein, Extension Horticulturist in Kansas: "I appreciate your putting us on your list to receive Fruit Notes. One of the items by Mr. Southwick on refrigerator car storage reminds me that we have found it a very satisfactory system here in Kansas, and some growers have 6 or 8 cars that they use for this purpose. Several growers have one or two cars. Many have arranged them so that they form three sides of a hollow square and arrange a roof over them so that it makes an interior for working area and slide doors on the front or fourth side that provide favorable working conditions and storage on a temporary basis in this large center area. Some are using ice on a temporary basis for early apples."

The Undersized Fruit Enterprise. Today's mail brought ten inquiries from Massachusetts folks about fruit problems. Four of these had to do with certain puzzles generally found in the small apple orchard. One grower has set 28 trees and intends to set as many more. Another has 6 trees, while a third has about all the troubles a grower would want, with a single tree. What bothers us is our inability to give an encouraging reply. The orchard of less than commercial size is almost certain to be underequipped and is more likely than not to have a poor environment. Much as we'd like to discourage everybody from planting a backyard orchard, we recognize the inherent right of every individual to set as few or as many trees as he may desire. And anything we say will be more than neutralized by one first class nursery salesman. And so we face once more the annual problem of explaining why so few perfect apples are harvested in the average small orchard.

Planting a New Orchard? Where? On a better soil than the old one? Soil type is more important than variety, because the variety may be changed by top grafting, if necessary. If you are planting in a new location or replanting an old one, we suggest getting acquainted with your soil to a depth of 3 or 4 feet. Getting 300 bushels per acre is fairly easy in some locations, but practically impossible in others. Freedom from spring frosts, good soil drainage, good water holding capacity, and such conditions as favor deep rooting with adequate aeration throughout the growing season, - these are things we must look for in the new site. A good orchard soil will show only a gradual color change, and no gray layer as we dig to a depth of at least 4 feet. If you are interested in the Orchard Location Service now available, call your County Extension Office.

The Rochester Meetings. For lack of space in this issue, an account of certain interesting talks and exhibits at Rochester will be printed later. A new method of waxing apples to prevent shriveling, dropping of McIntosh, the land use program in New York, and research in by-products were some of the features.

Sawdust as an Orchard Mulch. Sawdust seems to merit more consideration as a mulch in the orchard. Not that it is an ideal material. But it is increasingly available, now that millions of board feet of hurricane timber are being sawed, partly in portable mills where the sawdust piles are mounting daily. The use of this material in orchards will be determined largely by the cost when delivered. An area may well be mulched liberally as an experiment wherever sawdust is to be had nearby at reasonable cost. For best results it should be spread at least four inches deep.

Salvaging a Waste Product. A New York farmer who combines orcharding with grain farming has hit upon a novel arrangement for placing the straw where it will do most good. In former years the straw was burned. Now the threshing is done at the edge of the orchard and the straw loaded directly onto a long tractor drawn skid from which a pile is dropped alongside each tree. Thus a former waste product is turned to advantage without extra handling.

Cold Storage Lockers. With the increased interest in cold storage lockers in various sections of the country for meats, fowl and butter, there has arisen the question of the suitability of such lockers for storing frozen fruits and vegetables. Most of the experimental work to date has been done by and for commercial interests. Accurate information as it applies to the individual cold storage locker will probably be forthcoming as Experiment Station projects get under way.
Lawrence Southwick

McIntosh Trees for Inarching. Attractive quotations on one year old McIntosh trees of two different sizes, suitable for inarching, have just been received. Any grower wishing to purchase stock of this kind for bolstering up the injured side of hurricane damaged trees may obtain details concerning the above nurseries, both as regards prices and sizes of trees, by dropping a postcard to the Pomology Department, Mass. State College, Amherst, Mass.

FRUIT NOTES - March, 1939

W. H. Thies
Extension Horticulturist

A New Bees-for-Pollination Project

The distribution of bees for pollinating purposes will be easier this spring through arrangements recently made by a committee of the Massachusetts Fruit Growers' Association. This project will result in closer cooperation between beekeepers and fruit growers than in years past. All details in connection with the rental of bees by fruit growers may be arranged through the secretary of the M.F.G.A., W. R. Cole in Amherst. The outline of the project presented by the committee is as follows:

1. M.F.G.A. through its Secretary-Treasurer as agent, to enter into contract with beekeeper to deliver bees in hives to fruit growers in Massachusetts at a specified charge. This service is to include the delivery to the farm and picking up the bees after bloom.
2. Hives to be clean, supposedly free from disease, containing at least six frames of bees with ample stores and brood and having been on these frames for at least ten days.
3. Fruit growers to remove to a tight building or destroy by burning all unused bee equipment and colonies known or suspected to be diseased on the property before the bees are delivered.
4. Growers to do everything within their power to have all bee equipment in their vicinity subject to same requirements as their own.
5. Fruit grower to agree to notify beekeeper two days in advance as to when he will be through his application of lead arsenate in the Pink Spray and two days in advance of the time that he would be using lead arsenate in the Calyx, or Post Bloom Spray. The grower when he places his order agrees not to apply any arsenical spray or dust while the bees are in the orchard.
6. Growers to place orders for bees as soon as possible in order to judge volume necessary, the specified charge to be deposited by April 20.
7. Payment to the beekeeper to be made within two weeks of delivery provided there are no complaints of unsatisfactory deliveries.
8. April 5 to be the dead line for the agreement between the beekeeper and the agent of the Association.

Specifications for a standard colony for pollinating purposes agreed upon by the committee and representatives of beekeepers, in a meeting on March 23, 1938 are as follows: "A normal colony consisting of not less than six frames of bees with brood in a 10-frame hive at a temperature of 60 to 65 degrees F."

In cases of dispute between fruit grower and beekeeper as to colonies delivered, it is suggested that a referee be appointed to make an inspection of the colonies and render a decision as to whether the complaint is justified or not. The cost of the inspection to be borne by the losing party. (If the grower makes a complaint and the colonies are found to be up to standard, the grower bears the expense, if the complaint is sustained by the referee the beekeeper pays for the inspection. The inspections to be made in the orchard). Qualified referees will be appointed by Dr. B. N. Gates, State Apiary Inspector.

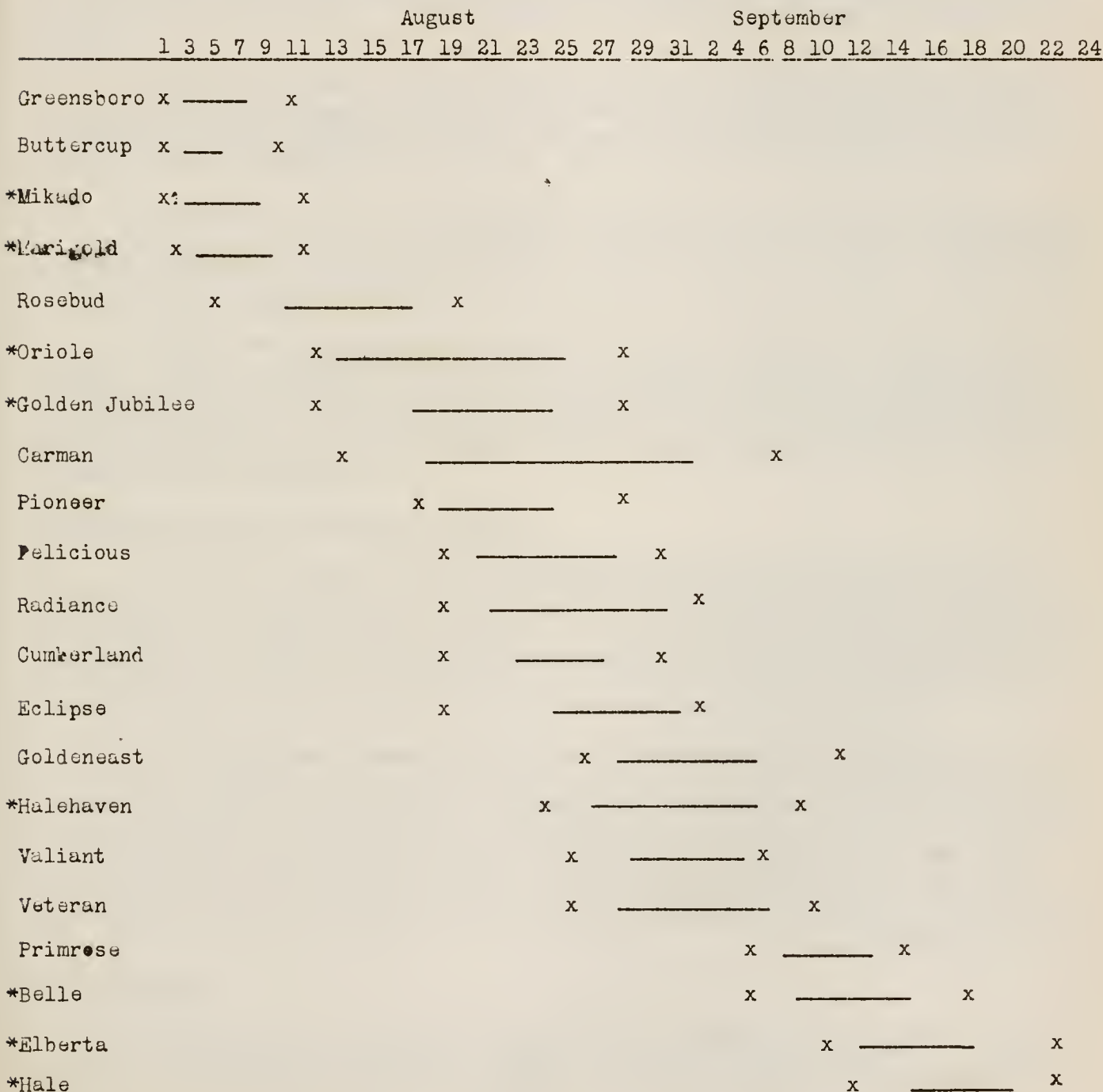
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Journal of Management Education 30(6)

Ripening Season of Peach Varieties in Massachusetts

The census figures for 1935 show a sharp decrease in the number of both bearing and non bearing peach trees in Massachusetts. This decrease has two principal causes: (1) growers have become discouraged by the difficulties and have not been planting peaches, (2) the cold winter of 1933 and 1934 killed a great many trees. For those hardy souls who have the courage to plant peaches, the following graph shows ripening season of the various varieties. The bars extend from the average first date to the average last date of picking. The x at each end indicates the earliest and the latest date on which the variety was picked. In most cases the averages include four years, in a few only two or three.



*Varieties recommended for planting in Massachusetts
 —Average picking dates
 x Extremes

Winter Mouse Activities

W. W. Dykstra submits the following summary of the mouse situation. "Orchard inspections by the Biological Survey during the past few weeks have revealed two types of mouse injury. (1) Damage above ground, extending up to ten inches above the surface. Fifteen such trees were observed from one spot in a Nashoba orchard. (2) Damage below ground, extending from trunk along roots (most common where trees were reset after the hurricane without filling in holes at their bases). In one instance all roots were completely stripped for a distance of four feet from the tree base. Such trees appeared to be concentration spots for twenty or thirty mice. Well defined trails spread fan shape to neighboring areas.

"In orchards where control was not practiced, mouse populations remained at a high level throughout the winter. However, it is probable that rains with alternate freezing and thawing during the past few weeks have killed off many of them. In other instances it has forced them to migrate to higher ground.

"Tree bases should be thoroughly inspected six inches below ground as soon as the frost is out. If bridge grafting or inarching is necessary, the surrounding area should be re-poisoned to prevent possible damage to grafts. Apple baits of good quality should be used.

"Mouse damage to apples in cold storage is not always caused by the deer mouse. Recent investigations have revealed considerable damage by meadow mice. At least sixty were found in one cold storage plant. They had constructed nests from shredded paper and raised young throughout the winter in spite of low temperatures maintained in the building. Grain baits are generally effective for control in such instances."

Refrigerator Cars for Storage Purposes

Two of the larger transportation ^{companies} have recently quoted prices on old refrigerator cars which might be suitable for farm storage purposes. These prices are subject to change without notice and are valid when and if cars are available.. Any grower interested in this matter may obtain full details by dropping a line to the writer. The cost of storage units made from such cars, as now set up on several Michigan farms, has been around 20 cents per bushel capacity.

For comparison, common storage costs in Massachusetts vary from 25 to 50 cents while the usual cold storage plants require construction expenditures generally exceeding 75 cents per bushel capacity. The variation probably runs from 65 cents to more than one dollar. Other possible advantages of old refrigerator cars for storage purposes are economy of operation, minimum expense for upkeep and replacement, and availability for instant use as effective cold storage. According to reports, the use of such cars in Michigan is increasing very markedly.
L. Southwick.

Apple Exports

According to the Bureau of Agricultural Economics (Washington, D. C.), exports of United States apples from July 1, 1938 to January, 1939, totaled 8.6 million bushels compared with 6.9 million for the corresponding period last

The first of these is the fact that the
 of the world is not a uniform one. It is
 a world of many different peoples and
 cultures. The second is the fact that the
 world is not a static one. It is a world
 of constant change and development. The
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season. This favorable export situation has resulted despite the relatively small 1938 crop. It has been due largely to increases in basket exports to countries which have not been important importers in the past, and to the significant increase of total exports to the United Kingdom. This latter market takes over 80 per cent of our apple exports. The remainder have gone not only to other European countries but also to such places as Brazil, Philippine Islands, Palestine, Egypt, Cuba, Argentina and Canada.

Some actual import figures may be of interest to readers of Fruit Notes. The imports of deciduous fruit into the United Kingdom for the week ending March 14 were as follows: Apples, from United States, 18,000 barrels, 119,000 boxes, 12,000 baskets, from Canada, 21,000 barrels, 33,000 boxes, from South Africa, 2,500 packages. Other fruits were imported from various countries as follows: Pears, United States, 200 boxes (season over), Argentina, 19,000 boxes, Australia, 800 boxes; South Africa, 33,000 packages. Grapes, Argentina, 1,500 boxes, South Africa, 89,000 packages.

Prevention of Shrivelling and Scalding in Storage

At the recent Rochester meetings there was an interesting exhibit to show the effects of waxing on the condition of apples taken out of storage. One part of the exhibit showed two lots of Golden Delicious which were kept one week at room temperature after remaining three months in cold storage. The first lot (unwaxed) was very badly shrivelled. The second lot (waxed when removed from storage) was only slightly shrivelled. The effect of storing at relative humidities ranging from 50% to 98% was clearly shown in another exhibit. In each case waxed and unwaxed apples showed a marked difference in the amount of shrivelling although the shrivelling of even the unwaxed apples stored at 98% relative humidity was much less than at 50%.

The relation of another type of wax (scald preventing) on Rhode Island Greening and also the relation of date of harvest was clearly shown in another exhibit. Apples picked in early September were treated in four different ways: (1) no treatment, (2) packed in oiled paper, (3) washed and treated with plain wax, (4) washed and treated with scald preventing wax. All of these apples had been stored $3\frac{1}{2}$ months and then kept for one week at room temperature. Lot 1 was very badly scalded. Lot 2 showed some scald. Lot 3 was badly scalded and Lot 4 showed only slight scald. A fifth lot had been picked on September 30 and stored immediately. These apples showed no scald even though no preventive treatment had been given. These exhibits suggest a need for allowing apples to mature properly on the tree. They also suggest that certain preventive measures may be taken to prevent storage difficulties.

Items from Here and There

Apple Yields in Washington. It is interesting to note the relatively low production of McIntosh in the State of Washington. The weighted average yield per tree for the state as a whole has been reported as approximately 3 bushels compared to 9 for Winesap, 8 for Stayman, 8 for Rome, and 6.4 for Delicious. With the average number of trees per acre approximately 62, the acre yield of McIntosh becomes 186 bushels and that of Winesap 558 bushels, making a difference of 372 bushels per acre. Remembering that these are average yields, the bountiful performance of their standard varieties is evident.

Apple Prices. In a 1937 price study including some 20 varieties of apples in a New York county, it was found that on the basis of total sales the highest priced important variety was Northern Spy. However, with the factors of grade, size and time of sale equalized, McIntosh brought the greatest returns followed closely by Delicious, Golden Delicious and Northern Spy. It is interesting to note the relatively poor showing of such well known sorts as Baldwin, Rhode Island Greening, Cortland, Wealthy, and Jonathan. It is problematical just how closely these New York results would agree with sales of Massachusetts apples.

Cold Storage Lockers. With the increased interest in cold storage lockers in various sections of the country for meats, fowl and butter, there has arisen the question of the suitability of such lockers for storing frozen fruits and vegetables. Most of the experimental work to date has been done by and for commercial interests. Accurate information as it applies to the individual cold storage locker will probably be forthcoming as Experiment Station projects get underway.

L. Southwick

Getting Trees off to a Good Start. This is the title of a recent article in the Rural New Yorker by H. B. Tukey of the Geneva Agricultural Experiment Station. He says, "The slowness of newly planted trees to start the first year they are set in the orchard has become a problem of increasing concern to orchardists in New York State. Such trees often make weak growth the first season, not to mention the poor stand of some classes of trees, as the sweet cherry. Add to this the modern demand for early fruit production from a young orchard and the problem looms as one of the important ones facing the fruit industry today. Yet all growers do not agree on the reason for the difficulties. Some attempt to pass the blame back upon the nurseryman while others feel that the fault lies largely with the planter himself."

Origin of Peach Cankers. As a means of determining where peach cankers start a total of 1418 cankers have recently been studied by plant pathologists at Geneva, New York. The cankers in question were caused by two rather common fungi not including the fungus causing brown rot. The source of cankers was as follows. pruning wounds (41.5%), fruit pedicels (22.8%), die back of terminals (14.6%), dead buds (9.2%), lenticels on bark (6.1%), mechanical injuries (2.7%), winter injuries (1.2%), leaf scars (1.1%), others (.8%).

Protection of Tree Wounds. Speaking before a group of tree wardens in Amherst, R. P. Marshall of the Division of Forest Pathology, U.S.D.A., voiced a need for more experimental work on the effectiveness of various wound dressings. In general, Bordeaux paste or Bordeaux paint is quite satisfactory although some people object to the color. Asphalt preparations may provide a waterproof film over the wound with blisters underneath due to oozing from the wood. A wound dressing which proves satisfactory in one locality may not be ideal a few miles away. The work of insects is sometimes an upsetting factor. He expressed a firm opinion that tree vigor is closely associated with the healing of wounds and that such things as fertilization, water supply and protection of the foliage go hand in hand with the callousing over of pruning wounds and other scars.

Water Culture Method Known Centuries Ago. The growing of useful plants in water cultures is not as new as most people are led to believe. According to California Circular 347 by Hoagland and Arnon, a man named Woodward grew spearmint in several kinds of water: rain, river, and conduit water to which he in one case added garden mold, as early as 1699.

A Bit of McIntosh History. All Massachusetts fruit growers should be interested in facts about the early history of the McIntosh. Recent correspondence with members of the McIntosh family gives some interesting information. The original tree was found by John McIntosh (born August 15, 1777, near Schenectady, N. Y.) not in 1794 as generally believed, but sometime after 1811, the year when he took possession of the farm in Dundas County, Ontario. The tree was injured by the burning of the nearby dwelling in 1894. The tree bore its last apples in 1908, died shortly afterward and was finally removed in 1910 by a great grandson of John McIntosh, whose house burned in 1925 and with it the last wood of the original McIntosh tree. It is interesting to know that there are now trees near the place of origin which are believed to have been propagated from the original tree, all bear apples of the blushed type. J. K. Shaw

Apples for Detoxication. Dr. F. W. Hofmann of the Virginia Agricultural Experiment Station makes this statement regarding the varied uses of apples. "The malic acid in apples is clearly essential to a balance of the digestive juices as well as correcting certain digestive disorders due to abuse. Nothing satisfies a "hangover" of the inebriate the day following a so-called "bender" or alcoholic debauch so well as a glass of sparkling apple cider. The malic acid has a most beneficial, restorative and invigorating property."---L. Southwick

A Trend Toward Diversification. Growers are seriously considering farm enterprises other than fruit in the State of Washington. Poultry raising is heading the list of other farm enterprises. An agent for the Farm Security Administration recently reported 50 new applications from farmers for diversification assistance in Okanogan County while in Chelan County an extension worker reports that cattle, chickens and general gardening are on the increase.

Fruit-of-the-Month Club. A fruit-of-the-month club, organized by a fruit growing company at Reseda, Calif., is the latest thing in farm marketing. Each month, members of the club receive by parcel post a container of the California fruit that is at its peak. This varies from guavas and nectarines to pomegranates and avocados. There is no membership fee, members paying only the price of the fruit they receive, plus postage.

Land Classification. The State of New York is being divided into 7 classes with reference to the adaptation of the soil for agricultural purposes. Classes 1 and 2 have no agricultural value. Class 3, the lowest type of farm land, makes up 38% of the state, Class 4 makes up 1%, Class 5 (better farm land) 8%, Class 6 (best farm land) 1%, and Class 7 (7%). In a thorough going study of agricultural resources it is found that 29% of the land is now producing only 3½% of the agricultural crops in the state. The cost of making a detailed land study in the average county is about \$10,000. The labor income on Class 3 land is \$204 and on Class 6 land \$1285. It costs 50% more to provide schooling for children living on Class 2 land than on Class 5 or better.

Interesting Literature on Boron. A new publication entitled, "Boron in Agriculture," is now available from a large commercial concern dealing in that material. This publication includes excellent illustrations of vegetable and fruit crops showing boron deficiencies along with a fairly complete bibliography of 49 references. Any grower interested in this new field of agricultural research may obtain further details by dropping a postcard to the Department of Pomology, M.S.C., Amherst, Mass.

Timely Suggestions on the "X Disease"

For those who already have a peach orchard and for those who expect to plant peaches, the control of "X disease" is of prime importance. Dr. O. C. Boyd gave a full discussion of this disease in Crop Disease Notes, No. 9, for September 1, 1938. Those wishing full information are referred to this report. The control measures given by Dr. Boyd are as follows.

1. Since the X Disease in peaches is definitely associated with the presence of nearby infected choke cherries, do not start a new orchard until choke cherries and other scrub wild cherries nearby are destroyed.

2. If diseased choke cherries are growing near a peach orchard, and if there are no, or only a very few, infected peach trees present, destroy the cherries and remove the affected peach trees. But if the disease is well established in the orchard, the removal of the diseased cherries and peach trees will in all probability not be worth while. The removal of individual, diseased branches is not a cure for trees appearing otherwise to be healthy, for the virus is present throughout the tree, including the roots.

3. Kill the choke cherry trees, not by grubbing or by chopping them down, but by spraying the foliage thoroughly with a chlorate weed-killer, a proprietary mixture of sodium chlorate and a deflagration agent. The Connecticut Station recommends three-fourths pound per gallon of water, sprayed on the trees while in full leaf. The tree should not be cut down until the following season or later after it has failed to show signs of life. The poison in the spray is absorbed by the foliage and tender twigs and conveyed to all other parts of the plant, including the roots, resulting later in the death of the entire tree. If a sprayed tree shows life the next season, give it another application.

4. Avoid buds from diseased orchards for propagation purposes. Also, give preference to nursery stock from areas where the disease does not occur.

Now is the time to get ready to spray your choke cherries. Chlorate weed killers can be obtained from at least three manufacturers. Names will be sent on request. These materials cost about 7 to 10 cents per pound depending on the kind and quantity of material bought. The quantity required will depend on the number and size of choke cherries to be sprayed. Better make a generous estimate and have plenty of material on hand.

Under average conditions the orchard should remain healthy if all choke cherries within 200 feet are removed. If you wish to be very sure, remove all within 300 to 400 feet.

J. S. Bailey

FRUIT NOTES - April, 1939

W. H. Thies
Extension Horticulturist

Dates of McIntosh Bloom in Amherst

At present it appears that the spring of 1939 will be late and we may expect that McIntosh and other varieties will bloom later than usual. Yet a few hot days can change the prospect rather quickly. We have the blooming dates of McIntosh for a period of 17 years beginning in 1922. In 13 of these years McIntosh has bloomed during a 7 day period beginning May 11. In 1930 full bloom was May 8 and in 1938 it was on May 3. In 1924 it was May 21 and in 1926 it was on May 22. The average date of bloom is on May 14 or 15. Thus in only four years has the date of bloom fallen outside of the week of May 11.

The date of bloom depends mostly on the air temperature. It is well known that if we bring a branch of any fruit tree into a warm room in late winter any fruit buds on it will come into bloom in a short time. Little development will take place at temperatures below 45° and the most rapid development at temperatures around 85°. The presence of a heavy snow cover in northern New England will have no direct effect on the bud development in Massachusetts but the continued presence of snow indicates low temperatures there. This means low temperatures in Massachusetts and consequently retarded bloom. A late bloom is favorable for a good fruit crop because every passing day means a decreased probability of a frosty period. This is why we have less damage from spring frosts in New England than they have in localities further south where the period of frost danger is longer than it is with us.

J. K. Shaw

BEES FOR POLLINATION. LAST CALL. THE BLOSSOMING PERIOD IS ONLY A FEW DAYS OFF. GROWERS WISHING TO OBTAIN BEES THROUGH THE M.F.G.A. MUST PLACE ORDERS BY MAY 9. MANY STRONG COLONIES HAVE BEEN LISTED WITH SECRETARY W. R. COLE, ONLY A FRACTION OF WHICH HAVE BEEN TAKEN THUS FAR.

Observations on Red Mite, Aphis, and Bud Moth

From our own observations the European red mite infestation appears to be very generally light, and only in small, more or less isolated areas, are moderate numbers of eggs to be found. No reports of heavy infestation have been received.

The eggs of the apple aphids, however, are generally present in all parts of the State and are very abundant. Counts made from twigs collected in the College Orchard showed nearly 18,000 eggs per 50 twigs, an average of 10 to 11 eggs per linear inch of twig. This is the heaviest and most general infestation of overwintering eggs present in the College Orchard in many years.

Professor Whitcomb reports that bud moth promises to be very abundant in some orchards in Middlesex County. Orchard counts indicate the greatest number of hibernating bud moth larvae which have been observed or reported in eastern Massachusetts in recent years.

A. I. Bourne

Oriental Fruit Moth Parasites

It should always be kept in mind that the work on biological control of the Oriental Fruit Moth is still more or less in its infancy and there are many points on which more information is needed because of the many factors, both climatic and entomological, which influence the effectiveness of parasite liberation.

On the basis of our present information, investigators have come to believe that the number of *Macrocentrus* parasites should be in the ratio of approximately one colony of 250 parasites to 300 trees, in order to be effective the first year after liberation. Due to the fact that there are neither sufficient funds nor personnel available to provide enough parasites to distribute to all of the peach orchards in the State on this basis, an attempt has been made to introduce the species into as many orchards as possible in the hope that once it is able to establish itself, the addition of a limited number of parasites each year will supply a surplus at the most effective period to give maximum control of the Fruit Moth.

A. I. Bourne

Leather Waste as a Fertilizer Material

J. N. Everson of the Agronomy Department submits the following interesting facts about leather dust and leather scrap. "During the process of tanning leather, either chrome or tannic acid method is used. The protein material in the original hide is rendered impervious to the action of water, and bacteria act upon it very slowly. This means that such substances as leather dust and leather scrap will remain in the soil for years without giving appreciable amounts of nitrogen for plant use. Numerous states have as a basic part of the fertilizer law a statement that leather scrap or untreated leather shall not be used, and that the presence of tannic acid will be prima facie evidence that leather was used. If tannic acid is found in the fertilizer, the whole lot is subject to confiscation. I might refer you to the fertilizer law of the State of Indiana as a typical example of such laws. You may get this law by writing, as I have no copy of it at present. Similar laws are found in the statutes of Arkansas, Missouri, Louisiana and Tennessee.

"In using leather for fertilizer purposes, the fertilizer manufacturer uses two processes of treatment, either he steams the leather or treats it with sulphuric acid, in either case rendering the nitrogen nearly as available as the nitrogen from dried blood."

Effect of Sulfur on Leaf Activity

This subject is covered in an article by N. F. Childers in the April issue of the *American Fruit Grower*. Among other things he says, "Just how liquid lime-sulphur may reduce leaf activity to the extent that it does has not been answered to any great satisfaction. Suggestions have been made that the presence of the spray film on a leaf may cause the 'breathing pores' to close and obstruct the passage of the gaseous raw material used in photosynthesis - carbon dioxide. Or there may be a destruction of the internal cells and the green coloring within the leaf tissues. It is definitely known that an abundance of green coloring, or chlorophyll, in the leaves is highly essential for rapid and efficient food production."

Sulfur has been used as a spray for over 100 years. The earliest record of its use is that of J. Robertson in England in 1821. In 1852 Grison prepared a material by boiling sulfur and slaked lime. This was probably the forerunner of lime sulfur, the use of which was first sug-

gested by Cordley in Oregon in 1908. It has been very commonly used in the control of apple scab for more than 20 years although there is evidence that it has been responsible for a reduced yield in several sections. In the Annapolis Valley, for example, the total yield of apples amounted to 1.7 million barrels in 1911. That was before lime sulfur was used. During the next eight years the yield never attained 1 million barrels. This reduction is believed to be due in part to the effect of lime sulfur on leaf activity. By 1921, there was a decided shift to fungicides other than liquid lime sulfur and the apple crop in that year amounted to 1.5 million barrels.

The early reports of lime sulfur injury were made largely on the basis of foliage burn apparent to the naked eye. In recent years refined methods of measuring leaf efficiency have been devised. The method involves a determination of the carbon dioxide content of air before and after it passes over a leaf enclosed in a transparent container. The absorption of carbon dioxide is proportionate to the food manufactured by the leaf. It is possible by this method to determine the efficiency of leaves under controlled conditions, including leaves which have been sprayed by different materials. The behavior of such leaves may readily be compared with other leaves which have not been influenced by caustic material. Studies by Hoffman show that the efficiency of apple leaves may be reduced 10 to 100 per cent by 1-40 lime sulfur. In Ohio it has been found that solutions at strengths of 1-80, 1-100, or even 1-125 may cause equally as severe reductions, especially when the temperature reaches 90° F. Christopher of Rhode Island reports a reduction of 10 to 20 per cent in leaves sprayed with a wettable sulfur only. A 5-10 per cent reduction has been reported for a period of a week after the application of a straight sulfur dust. Dry lime sulfur seems to have less effect on photosynthesis than liquid lime sulfur although somewhat more than the wettable forms.

Childers, in the above article, concludes by making the following statement: "If liquid lime-sulphur should be cut from the calendars and replaced entirely by elemental sulphurs, it would be well to keep in mind a statement recently made by an Ohio grower, 'As far as I am concerned, I intend always to keep a drum of liquid lime-sulphur in the back of my shed in case I should get caught with a bad case of scab. That's one spray we can depend on to burn it out.' This is not a bad suggestion."

Spraying Technique as Seen from the Side Lines

In the rush of the spraying season it is easy to overlook some fundamentals in orchard pest control. Holding a spray nozzle from daylight until dark leaves little time for reviewing one's efforts and studying ways of doing the job more efficiently. The operator is in a poor position to judge the thoroughness of coverage. It is so much easier for someone "on the side lines" to criticise the job and make suggestions for improvement. The writer recommends taking time off occasionally to observe the coverage of a tree while someone else holds the nozzle.

In about 9 cases out of 10 a tree is unevenly covered because too much of the spray material is directed from a point 6 or 8 feet from the ground and just outside the tips of the branches. This generally results in an excessive coverage of the outer branches and a very scanty coverage in the top center of the tree. Those outer branches, if sprayed entirely from the one position, may actually drip while the top center has only the most spotty kind of coverage. This suggests an urgent need for a

different technique. Any grower interested in studying various recommended methods of covering trees is invited to look over Leaflet 178, "Spraying and Dusting Fruit Trees." A copy may be obtained from your county agent or from the State College. Spraying methods are described and illustrated on pages 18 to 24.

Another common mistake in spraying fruit trees is found in the amount of material used per tree. It takes a clever driver to propel a tractor at just the right speed to enable the operator of a spray nozzle to spray each tree with thoroughness. One tree may require 5 gallons and the next one 15. Suggested amounts for trees of different sizes are indicated on page 19 of the above leaflet.

No one would question the importance of using the right spray materials. It is a matter of common knowledge that considerable differences may be found in the various brands on the market. But after all is said and done, the brand of material is of far less importance than the manner in which it is applied. Most crops of scabby, misshapen apples are traceable to faulty coverage and poor timing. If these two items are given due consideration there will be less need for discussing the merits of this or that brand of material.

Determining the Fertilizer Needs of the Soil

In a recent issue of Virginia Extension Division News, N. A. Pettinger, Agronomist of the Va. Agr. Exp. Sta., outlines several common sense methods of determining what fertilizers should be used. He says, "Many people have the idea that all that is needed to determine what plant foods are lacking in any particular soil is to make a complete chemical analysis of it. Almost every day the soils analyst here at Virginia Tech receives samples of soil accompanied by requests for a complete chemical analysis in order to determine its fertilizer requirements. The college does not comply with these requests as a rule, for two reasons, (1) the state does not provide the college with funds for this type of work, and (2) a chemical analysis is not a reliable guide to fertilizer needs. The last part of this statement is justified by the fact that we now know that plants can use only a part of the plant foods contained in soils."

The writer suggests that we study the symptoms or conditions which indicate the need for the various plant food elements. If these symptoms fit your particular soil you are justified in applying a fertilizer containing the plant food element which that deficiency indicates. For example, nitrogen is usually deficient, - (1) If the soil is sandy. (2) If the soil is grayish in color. (3) If the soil is very acid. (4) If the soil is deficient in organic matter. (5) If the plants grow slowly and the leaves are pale green or yellowish in color. (6) If the top soil has been washed away. (7) If legumes have not been grown regularly in the rotation. (8) If the land has been burned over from time to time. He suggests that nitrogen is usually abundant in a soil well supplied with organic matter where plants are making good rapid growth and the leaves are dark green in color.

One of the best ways of determining whether a soil is deficient in lime and other plant food elements is to apply them separately in a field about which information is desired. If a crop does better where a certain element has been added the chances are that the soil is deficient in that element. Obviously, such a method is not as applicable to orchards as to vegetables or grass crops. In the case of fruit trees the cover crop is generally a good indicator of mineral deficiency.

The Why and How of Inarching

There has been much discussion among Massachusetts growers this spring concerning the merits of inarching, the best method of performing the operation, and the kinds of trees most likely to benefit. Inarching may be considered as a form of insurance. It provides a means of bolstering up a damaged tree, as for example, a tree whose roots have been badly broken by the hurricane or seriously handicapped by the activities of mice under ground. No one can be sure that a given tree will recover promptly if inarched. Neither can he diagnose with certainty the condition of the present root system and its ability to develop new roots without inarching. With these facts in mind we might look upon the planting of a young tree alongside a damaged bearing tree merely as a "shot in the dark." It may or may not justify the expense. But when we consider that thrifty young McIntosh trees may be bought for 10 cents apiece and that such a tree may be inarched in half an hour or less, it looks as if the expense and effort are well worth considering where the roots on one side of the tree are badly broken. Either one or two year old trees may be used.

One simple method of inarching is as follows. Dig a hole a little distance from the trunk in order that the root system of the young tree may have a better chance to develop. Lay the young tree in the hole, bending the top in such way that it will bow upward leaving it more or less parallel with the trunk of the tree to be inarched. The inlay method of grafting is recommended. This involves cutting out a rectangular section of the bark from the trunk, the width corresponding to the diameter of the young tree. The latter is cut off squarely and the side toward the trunk is sliced deeply and smoothly to a point 4 or 5 inches from the tip. The graft is then completed by tacking with 2 flat headed brads (18 to 20 gauge) and waxed as in top grafting. As buds on the young tree develop they should be rubbed off since any branches which form will make the young tree less efficient as a channel between the injured tree and the newly developing root system.

Items from Here and There

Peach Trees in a Hen Yard. That hens are not color blind is evidenced by a recent observation in a young peach and apple orchard used as a poultry range. It so happened that the area was practically devoid of grass and for that reason the hens seemed especially interested in green feed. Finding nothing more attractive than the green bark of the young peach trees they stripped several of them, leaving the apple trees untouched. This suggests one more reason for not trying to operate an orchard in close proximity to a heavy concentration of hens. One of the other reasons is that most hen yard orchards are sprayed so inefficiently that they produce a bigger return from shade than from fruit.

Modern Ideas in an Old Book. In browsing through a textbook of Pomology written by S. E. Todd in 1871 we find such things as these. A discussion of the value of mulching an orchard, detailed directions for pruning a tree according to the central leader system, and suggestions for supporting trees in such way that they will not be blown over by high winds. In matters of soil management and tree care the book appears quite modern in many respects. But when it comes to pest control the author is groping hopelessly in the dark. He hasn't the slightest idea what causes fire blight and his principle contribution to insect control is a series of time consuming recommendations which involved a tremendous amount of hand labor. On one page he uses the expression, "catch 'em and kill 'em" no less than 6 times.

Time to Look For Mouse Injury. With a very heavy mouse population in many orchards last fall, there is reason to expect considerable girdling except where the poison bait was thoroughly distributed. Hurricane damaged trees have offered an unusual opportunity for mice to work below the ground level. We advise every orchardist with trees surrounded by grass cover to examine tree trunks for mouse injury at the earliest opportunity. So often this kind of damage is not suspected until late summer when the foliage appears "off color." That means a year's delay in bridge grafting and a resulting weakening of the tree. Mouse injury is not such a serious thing if we find it promptly and do a thorough job of bridge grafting. Early spring is the ideal time to do both these things.

New Leaflet on X-Disease. O. C. Boyd, Extension Plant Pathologist, has recently prepared a 3 page publication covering the so-called X-Disease of peach trees. He outlines the cause and manner of spread, symptoms and nature of injury together with a seasonal history of the disease and then tells how the disease may be controlled. Any one interested in growing peaches should look over this new publication. A copy may be had by dropping a post card to the author.

Why Some Trees Fail to Grow. We often see apple trees making practically no terminal growth throughout the top, or in some cases on one side only. Instead of terminal growths of varying lengths normally found on bearing trees practically all growing points are developing into spurs. It is not uncommon for such trees to bloom very heavily every other year. The reason for this abnormal condition may generally be found in injury to the trunk or main roots near or below the ground level. Obscure mouse injury, or in some cases winter injury, should be suspected particularly where a tree fails to respond to fertilizer applications. And if the above mentioned spur growth is well developed it is a safe bet that the injury dates back two years or more.

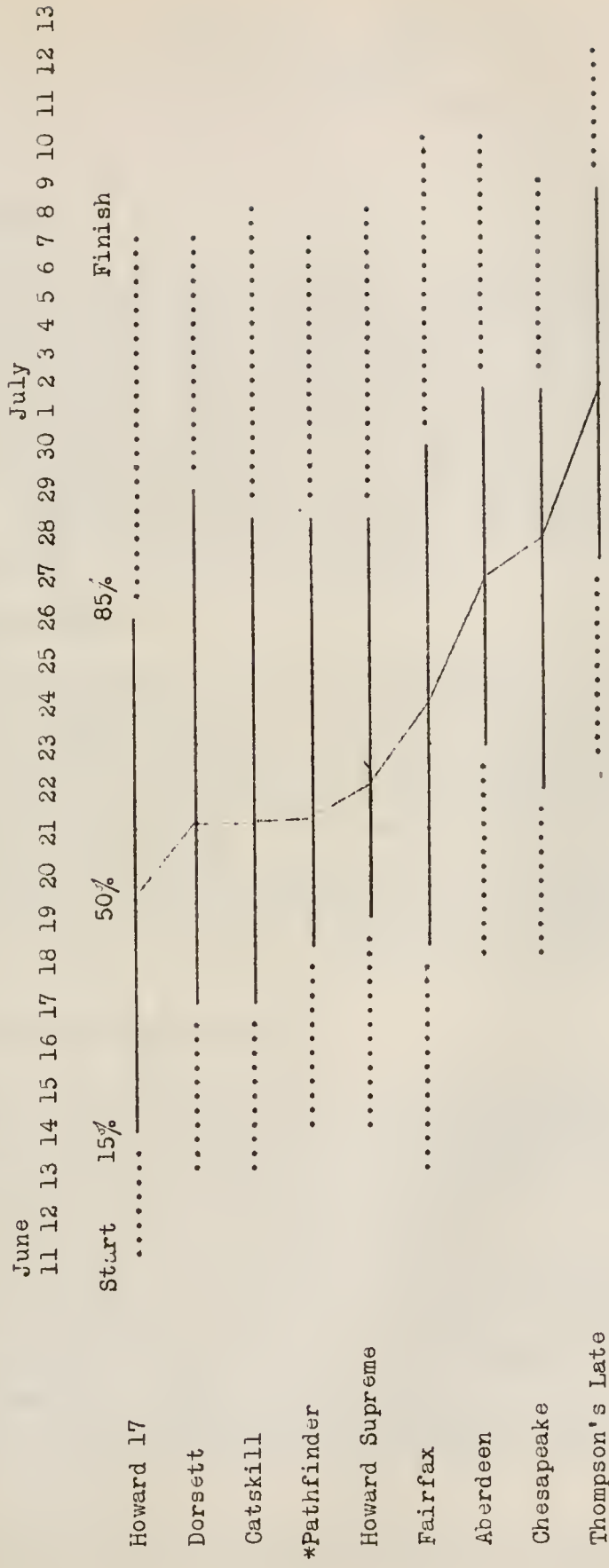
Effect of Radio Waves on Insects. T. J. Headlee of the N.J. Agr. Exp. Sta., discusses this intriguing subject in N. J. Bulletin 568. He has made an extensive study looking toward the elimination of certain insect pests by electrical means. Obviously, such a method would seem more practical where plants are closely confined, as for example, in the greenhouse, than in a commercial orchard. He says, "Insects respond so much more readily to radio waves than do plants that in many cases insects may be destroyed and plants be left unharmed by the same treatment."

The Spray Concentrate Method of Controlling Pests. A new method of applying spray mixtures is being studied in the state of Washington. It involves the use of spray chemicals in the form of a ready-mixed concentrate and the injection of such a concentrate into the suction line of a high pressure spray pump. Advantages claimed are elimination of agitation of the finished spray mixture, increased accuracy of application by metered flow, and a saving in labor. This work is described in Bulletin 367 of the Wash. Agr. Exp. Sta. at Pullman.

Synthetic Growth Substances. K. D. Brase of the Geneva Agr. Exp. Sta. in a recent issue of Farm Research tells of recent experimental results with a number of chemical compounds, including certain acids (indole-acetic, indole-butyric, etc.) as stimulators of roots in cuttings. He says, "It is apparent that different species and even varieties within the same species respond in different ways to treatments with synthetic growth substances."

Picking Season of Strawberry Varieties, M. S. C. (1936-38 inclusive)

What is meant by season in strawberries? The accompanying chart shows a three year average of the actual picking period for a few of the strawberry varieties being grown in the College bed. It can be seen that the extremes of the first six varieties, from start to finish, do not show so much differences in season as the period during which the bulk of the crop is being picked. Furthermore, it appears that none of these newer varieties can replace Howard 17 where earliness is of primary importance.



The cross-line marked 50% indicates the date when half of the crop of the respective varieties had been picked.

*Records on Pathfinder are for 1937 and 1938, only, but during those years it ripened with Catskill and Dorsett.

A. P. French

FRUIT NOTES - May, 1939

W. H. Thies
Extension Horticulturist

Aphids Plentiful

Not in recent years have aphids been as plentiful on the buds of apple trees as they were about May 1 this year. However, specimens from a dozen different orchards in Middlesex County all proved to be the grain aphis which is the least troublesome of those commonly found on apple trees. In the past when grain aphids have been abundant they have attracted much attention during the pink and blossom periods but actually caused little serious damage. About the petal fall stage they have migrated to the grasses and have disappeared from the apples. A heavy infestation of grain aphis also is conducive to an abundance of lady beetles, syrphus flies and other aphis enemies which help tremendously in keeping the aphids in check. Incidentally, lady beetles have been seen frequently on the trees this spring.

W. D. Whitcomb

The Bud Moth Situation

Bud moth cocoons have been quite plentiful in orchards where this pest was destructive last year. In fact, a microscopic examination of twigs from a poorly sprayed orchard revealed an average of 37 bud moth cocoons on each 100 fruit spurs, which is considered a very large population. Larvae emerged from these cocoons from April 27 to May 6, mostly during the late silver-tip and early delayed dormant stage of buds. Sprays applied from about April 20 to May 3 should have been timely.

An extensive spraying experiment for bud moth control using various combinations of dinitro-phenol, dinitro-cresol and oil-nicotine has been started and should yield some very helpful information for combating this pest in other years.

W. D. Whitcomb

Pine Mice in the Connecticut Valley

Here's an interesting story on pine mice, submitted by W.W. Dykstra, District Agent in Rodent Control Work. "Recent trapping investigations by the Biological Survey have revealed the presence of pine mice in three orchards at East Longmeadow and in one orchard at Three Rivers. It is possible that these rodents are also present in orchards immediately north, east and west of the area, and trapping checks are being continued.

"One of the easiest methods of determining the presence of these mice consists in examination of tree roots pulled out because of hurricane damage. If roots show extensive deep injury over a period of several years, pine mice may have been responsible. Such trees generally appear stunted and bear heavy crops of small fruit. Trails are beneath the surface and are not easily detected except for presence of holes around the tree.

"Pine mouse infestations in Massachusetts appear to be confined to small areas and are not general throughout the orchard. These mice prefer a light

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sandy soil, and they may be present in clean cultivated orchards. Fruit growers suspecting presence of this rodent are advised to contact the Biological Survey at 410 Federal Building, Worcester."

Twilight Meetings

Again the "seven o'clock orchard clinic" is in full swing among Massachusetts orchardists. Eight such meetings were held during the week of May 15, of which the writer was able to attend four. Attendance and interest have been excellent. Following is a partial list of sessions scheduled during the next few weeks:

Essex County - May 25, Greycroft Farm, Wenham. June 1, Gilbert Wallace, Bradford. June 8, Ellis Orchards, Melrose. June 15, Livingston Orchards, Andover. June 22, Norris Orchards, Lynnfield.

Middlesex County - May 24, Charles Raddin, Groton. May 31, H. A. Priest, Gleasondale. June 7, Harland Tuttle, Acton. June 14, Alfred Green, Ashland. June 21, Joseph Decatur, Wayland.

Worcester County - May 24, Wilbur Warren, Northboro. May 31, Ralph Easterbrooks, Dudley. June 1, T. B. Morse, Paxton. (Several others to be announced.)

Bristol County - June 21, Burnley Orchards, Seekonk. Other meetings being scheduled include two in Franklin County on June 19 and July 17. Norfolk County on June 20 and Plymouth County on June 22.

Farm and Home Week - July 24-28

The F & H Week fruit grower's meetings will be held this year on Thursday and Friday (July 27 and 28) instead of Tuesday and Wednesday as in several years past. The program will include two talks by W. H. Upshall of Ontario on "Recent Developments in the Fruit Industry" and "Making Peach Growing Profitable." G. G. Hitchings will tell us "Some Things I Have Learned in a Half Century of Orcharding," and J. B. Abbott will discuss "Better Production Through Soil Improvement." There will be a fruit growers' dinner at the Masonic Hall Thursday evening with a talk on "Hopes and Headaches in Western Horticulture" by L. R. Tucker.

Why Haven't My Trees Begun to Bear?

The failure of trees to bear when they seem to be old enough and large enough to produce considerable fruit is a question brought to us often. There are various reasons and sometimes it is difficult to be sure just what is the trouble.

1. The tree is not old enough. While some apple varieties may fruit at 3 or 4 years of age, other varieties may not bear until they are 12 or 15 years old. Northern Spy is a good example, it can hardly be expected to produce much until it is of this age. Most varieties should bear at least a small crop at 10 years or earlier. Most other tree fruits bear as early or earlier than apples.

2. Lack of cross pollination. Most fruit varieties require pollen from a different variety. If this is lacking, the tree blooms but fails to set fruit. If no other variety is near at hand the probability of lack of pollination is supported.

3. Fruit bud killing from winter cold or spring frosts. Peach buds are winter killed rather often. Spring frosts are rather rare except in or-

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chards located in low, frosty places. Failure to fruit from this cause is not likely in successive years.

4. Too heavy pruning. Severe pruning, especially heading back the branches, will delay fruiting. The remedy is obvious. Prune only enough to shape the tree and rid it of poorly located branches and bad forks, and do no heading back.

5. Faulty nutritive condition of the tree. Most of the obscure causes of failure to bear belong here. The tree may be over-vigorous, but this cause is less frequent than is commonly thought, yet it may occur with trees planted in rich, moist soil. Allowing grass to grow around the tree and withholding manure and fertilizer will often induce such trees to form fruit buds. Removing a ring of bark around the trunk or "scoring," that is cutting two or three rings through the bark in late May or early June when the trees are just coming into full foliage, is often effective. Lack of vigor may cause failure to bear. Cultivation and fertilization with manure or 3 - 5 pounds of nitrate of soda or 10-15 pounds of a complete fertilizer should benefit such trees.

J. K. Shaw

A New Experimental Apple Orchard.

The Pomology Department has planted an orchard of 900 apple trees, mostly on clonal stocks, to replace the stock and scion orchard removed a few years ago. It is planned in a way that will provide information on a number of questions. It involves not only the influence on common varieties of some 16 clonal stocks, but also on many new varieties and red strains. Provision is made for some kind of a fertilizer or cultural test to be begun after a period of uniform treatment to measure natural soil variations. While the trees are not planted on contours, the rows are on ridges designed to prevent erosion and provide better growing conditions. Varieties on each plot are randomized to compensate for soil variation. This will involve some inconvenience in management but is now considered essential in any field experiment.

Another newly planted orchard of 55 trees replaces a McIntosh orchard used for comparison of mulch and cultivation, which was destroyed by the hurricane. We hope to obtain from these two orchards much new information on problems in fruit growing.

J. K. Shaw

Winter Injury in Raspberries

Many red raspberry varieties have suffered from winter killing again this year. Just when the damage occurred is not known, but probably the sub-zero temperatures of last November had considerable to do with it. Early cold weather along with late maturing of the canes, as happened last fall, is very apt to result in winter injury. Varieties listed below are grouped according to the amount of cane injury evident in the College plantation this spring. Chief, Latham, Ranere - little or no injury. Indian Summer, Cuthbert, Taylor - moderate injury. Marcy - severe injury. Newburgh - very severe injury; killed back practically to the ground.

It is interesting to note that the rating of varieties for cold injury this spring agrees very closely with a similar rating made a year ago.

A. P. French

Sod Conserves Organic Matter

In a soil study covering 26 commercial orchards in Pennsylvania, perennial sod covers were found to be very effective in conserving both organic matter

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and total nitrogen. Annual cover-cropping was somewhat less depleting than clean cultivation without cover crops, but the following figures reveal the inadequacy of both of these systems from the long-time land-use point of view.

	Organic Matter (lbs. per acre)	Total Nitrogen (lbs. per acre)
Sod orchards	31,432	2,730
Annual cover-cropped orchards	21,599	2,108
Clean cultivated orchards	18,840	1,847

L. Southwick

Thinning Peaches

An important aspect of proper thinning was brought out recently by M. J. Dorsey of Illinois when he gave the numbers of peaches per 50-pound bushel as follows. 2 inch - 243, 2 $\frac{1}{4}$ inch - 220, 2 $\frac{3}{4}$ inch - 125, 3 inch - 96.

Thus it takes only a few more than one-third as many 3-inch peaches to fill a bushel basket as it does of the 2-inch size. In other words, for each bushel of 2-inch peaches the tree must develop about three times as many pits. This means a severe drain on the resources of the tree and a much poorer quality product.

L. Southwick

"Handling and Shipping Strawberries Without Refrigeration"

This is the name of a new Circular No. 515 by Fisher and Lutz of the U.S.D.A. Picking strawberries early in the morning while the fruit and air temperatures are relatively cool result in better shipping quality than picking later in the day. Care in picking is an extremely important factor in the carrying quality of strawberries. It is advisable to pick clean at least every other day, especially during warm weather. There is little difference in shipping quality between berries covered with cellophane and those not so covered. Decay of strawberries is closely associated with temperature, especially above 40°. Cultural practices which reduce the number of small berries is an important factor in marketing because it helps to eliminate the necessity of repacking.

Observations on Peach Growing in Western New York

In a recent bulletin (No. 710) by H. F. de Graff concerning the growing of peaches in Western New York, this statement is made, "Within areas that are climatically adapted to peaches, no other factor is so important to the success of the enterprise as a suitable soil." On one of the soil types studied (Hilton) it was found that on the average, at 7 years of age only 2/3 of the trees remained, whereas this same proportion still remained on another soil type (Alton) at 20 years of age. The average productive life of peach orchards on Hilton soil is about 15 years. During this period an acre of such orchards produced approximately 400 bushels of fruit. During the same period an average acre on Alton soil produced approximately 1600 bushels of fruit and was productive for several additional years.

The location of a peach orchard from the standpoint of frost susceptibility has long been considered important. Too little thought has been given in the past to the adaptability of the soil itself. The above observations emphasize the need for selecting not only a good site but a good soil if we are interested in large yields and a reasonably long period of productivity.

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Some Orchard Observations in New York and Connecticut

A three-day trip visiting orchards in the Hudson Valley and in Connecticut brought many interesting things to our attention and prompted the following disconnected comments.

1. Most varieties are blooming heavily everywhere. Frost damaged some flowers in nearly every section. While the set of fruit from flowers apparently not injured may have been reduced, the indications are good for a full crop in nearly every orchard.

2. Milton is widely planted and increasing in popularity in the Hudson Valley. The growers there say that the fruit grows more regular and uniform in shape as the trees grow older. We saw few Early McIntosh.

3. Many of the fine orchards in the Hudson Valley are in sod but the sod usually is left but a year or two before breaking it up. Sweet clover and orchard grass are favorites for seeding in orchards.

4. Paul Judson of Kinderhook has some fine trees growing where old trees stood. The stumps were pulled, manure placed in the holes over winter, then removed and the trees planted. The holes were filled with top soil and the manure used as a mulch. C. H. Gowdy at Greenwich, Connecticut has been equally successful in replanting under similar conditions.

5. To insure pollen every year, Mr. Gowdy has planted Wagener and Oldenburg in a new block of McIntosh, top working Cortland in the top of each.

6. The extensive orchards on flat land in the Hudson Valley have brought heavy sprayers into use here and there, carrying up to 1,000 gallons of solution. It is uncertain just what the effect of this great weight may be in compacting the soil during the spraying season.

R. A. Van Meter

Disease Control in Stone Fruits, Grapes, Etc.

The past two wet seasons have increased materially the danger of losses this year from peach scab, brown rot of all stone fruits, as well as black rot and downy mildew of grapes. Growers might well consider it just as urgent at this time of year to start the regular disease control program on these fruits as it is to spray for apple scab before and shortly after blooming. It is equally important to follow the regular spray program for each fruit crop throughout the season. Otherwise, these early season applications will be largely wasted. In no past season has there been more over wintering disease material than in the past winter. This is particularly true of peach scab which lives over winter on the twigs. It is also true of the strawberry leaf spot disease. New strawberry plantings of practically all varieties other than Howard 17 will need copper dust or spray applications regularly during the growing season if leaf spot is to be controlled.

O. C. Boyd

Items from Here and There

The Planting of the Apple Tree. What plant we in this apple tree? Sweets for a hundred flowery springs to load the May-wind's restless wings, when from the orchard-row he pours its fragrance through our open doors, a world of blossoms for the bee, flowers for the sick girl's silent room, for the glad infant sprigs of bloom, we plant with the apple tree.

And when above this apple tree the winter stars are quivering bright, and winds go howling through the night, girls, whose young eyes o'erflow with mirth, shall peel its fruit by the cottage hearth, and guests in prouder homes shall see, heaped with the orange and the grape, as fair as they in tint and shape, the fruit of the apple tree. ---William Cullen Bryant.

the 1990s, the number of people in the world who are under 15 years of age is expected to increase by 1.5 billion, from 1.2 billion in 1990 to 2.7 billion in 2010. The number of people aged 65 and over is expected to increase by 1 billion, from 350 million in 1990 to 1.4 billion in 2010. The number of people aged 15-64 is expected to increase by 1.5 billion, from 2.5 billion in 1990 to 4.0 billion in 2010. The number of people aged 65 and over is expected to increase by 1 billion, from 350 million in 1990 to 1.4 billion in 2010. The number of people aged 15-64 is expected to increase by 1.5 billion, from 2.5 billion in 1990 to 4.0 billion in 2010.

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Soil Organic Matter Important. Soil organic matter or soil humus is the most important storehouse of plant nutrients in nature, according to A. W. Blair and S. A. Waksman, as reported in New Jersey Bulletin 653 "Soil Organic Matter and the Living Plant." Humus invests the soil with a number of important physical and chemical properties which make the soil a favorable medium for plant growth. Humus decomposes gradually in the soil, giving off a slow stream of carbon dioxide, ammonia and available phosphorus. Humus also supplies the growing plants with a great variety of elements essential for plant growth. Humus also prevents the rapid impoverishment of the soil and combats deterioration by wind and water erosion.

New Publication on Dwarf Fruits. U.S.D.A. Leaflet #178, "Dwarf Fruits" by H. P. Gould discusses the following subjects. What are Dwarf Fruits? The Place of Dwarf Fruits in American Pomology, Planting and Care of Dwarf Fruit Trees, Planting Distances and Depth of Planting, Pruning and Training, Cultural Practices, Varieties, Age of Bearing, and Yield of Dwarf Apple Trees.

Dutton Heads Regional Market. Chester P. Dutton has been appointed manager of the Boston Regional Produce Market at West Cambridge by the directors following the resignation of Manager Arthur Magurn. Mr. Dutton has managed the auction at the Market for a number of years. Preparations are being made for a big season.

Starting the New Orchard. Helpful suggestions concerning the young orchard are contained in a recently revised Extension Leaflet No. 182, "Establishing Apple Orchards," written by J. K. Shaw. Following are the items discussed. Orchard Sites, Choice of Trees, Planting Plans and Distances, Varieties, Pollination, Should Fillers Be Planted? Setting the Trees, and Care of the Trees. A copy may be obtained from your County Agricultural Agent.

New Data on Orchard Soil Moisture. The variation of orchard soil moisture in 12 New York orchards over a 2-year period is reported in Bulletin 706 by Boynton and Savage of the Cornell Univ. Agr. Exp. Sta. They find that a lack of soil moisture seldom limits the productivity of New York orchards on well-drained, relatively permeable orchard soils which permit rooting to a depth of 4 feet. They indicate, however, that low permeability coupled with poor drainage and the presence of bedrock at a shallow depth, can be responsible for a direct lack of soil moisture and consequent low productivity.

Apple Silage. An interesting experiment on "The Digestibility and Feeding Value of Apple and Apple-Alfalfa Silage" is reported in Washington Bulletin No. 362 by Knott, Hodgson and Overholser. A mixture of 80 per cent of apples and 20 per cent of freshly cut alfalfa was ensiled. This material proved palatable and nutritious. On a dry matter basis the apple alfalfa hay silage contained an average of 5.4 per cent of digestible crude protein and 57.2 per cent of total digestible nutrients.

Possible Tree Injury from Anchorage Wires. There is some evidence to show that the wires used in supporting hurricane damaged trees are causing injury where wrapped around the limbs without adequate padding. One grower reports definite injury to the cambium where the wires were used in connection with short pieces of rubber hose. He believes that screw eyes are much safer and that they should be used to replace the other method of attachment on larger trees. This matter will bear investigation both from the standpoint of a secure anchorage for each damaged tree and a kind of anchorage which will not cause permanent injury to the branch.

Surface Area of an Apple Shows Surprising Rate of Increase. The importance of proper timing of the first and second cover sprays was emphasized by a study made last summer on the rate of increase of Gravenstein apples shortly after petal fall. W. D. Whitcomb measured a large number of apples on three successive days, May 19, 20 and 21. The average diameter on these three dates, measured in sixteenths of an inch, amounted to 4.3, 4.9 and 5.9 respectively. By applying the formula for calculating the area of a sphere, the apples were found to have 58 units of area on May 19 and 109 units of area on May 21. Thus, it was found that the surface area had practically doubled in two days. This helps to explain why the spray coverage on a rapidly growing apple is not as lasting as it might be. In the above experiment a spray applied on May 19 would certainly be less effective than one applied May 21 if curculio beetles were feeding most actively on the latter date.

U. S. Leads in Superphosphate Production. Production of superphosphate from phosphate rock was started in the United States in 1868, the year that the phosphate rock mines in South Carolina were opened up. Production rose from 31,400 tons in 1868 to 4,005,000 tons in 1938. Since 1920 we have produced each year between 16 and 27 per cent of the world's supply of superphosphate. There has been a particularly sharp expansion in Russia in recent years although Germany and Great Britain produce less than they did before the World War.

And That's a Lot of Fertilizer. In 1928 farmers purchased 7,985,000 tons of fertilizer containing 1,357,000 tons of plant food at a cost of \$275,000,000. In 1938 they purchased 7,504,000 tons of fertilizer containing 1,380,000 tons of plant food at a cost of \$192,000,000. As compared with 1928, 1938 showed 6 per cent less tonnage, 30 per cent less cost, and 2 per cent more plant food.

Farm Machinery Prices Higher. Early in May the Bureau of Agricultural Economics reported that prices paid by farmers for farm machinery other than motor vehicles in 1938 averaged 58 per cent above pre-war figures. Most types of machines were priced last year at 50 to 100 per cent above the pre-war price. Smaller increases were reported for small gas engines and 2-bottom tractor-drawn plows. Seven foot disk harrows are more than twice as high as they were 25 years ago.

Summer Sprays Important in Brooks Spot Control. In the May 1 issue of Seasonal Fruit Notes prepared by H. A. Rollins, Extension Fruit Specialist in Connecticut, we find this suggestion, "Experiments show that June and early July will be the critical period for the control of this disease. E. M. Stoddard has checked over 18 years' data on spraying experiments at New Haven and feels that the sulfur spray program as recommended should give control of Brooks Spot, provided sulfur sprays are applied at two-week intervals during June and early July. Brooks Spot is a fungus disease and should not be confused with Baldwin Spot." This disease caused much damage in certain orchards in southeastern Massachusetts last fall. It was especially serious in one orchard on Baldwins and Wageners. But wherever fungicidal applications were made as suggested by Professor Rollins this disease has not been troublesome in Massachusetts. Where wettable sulfurs are applied for scab protection during June and July little damage from Brooks Spot should be expected.

Wax Emulsions for Apples. An interesting experiment with various kinds of wax emulsions is under way in New York State under the supervision of M. B. Hoffman. He points out six instances where waxing may have some merit, as for example, with varieties like Grimes Golden and Golden Delicious which tend to lose moisture very rapidly unless stored under conditions of high humidity. Any grower interested in further details may drop a line to the Pomology Department, M.S.C., Amherst, Mass.

The first part of the paper is devoted to a discussion of the general principles of the theory of the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics, which are based on the principle of the uncertainty of the position and momentum of the particles. The second part of the paper is devoted to a discussion of the experimental results obtained in the study of the structure of the atom. It is shown that the experimental results are in good agreement with the theoretical predictions of quantum mechanics.

The third part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of matter. It is shown that the theory of the structure of the atom can be used to calculate the properties of matter, such as the density, the refractive index, and the specific heat. The fourth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the radiation. It is shown that the theory of the structure of the atom can be used to calculate the properties of the radiation, such as the intensity, the frequency, and the polarization.

The fifth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the molecules. It is shown that the theory of the structure of the atom can be used to calculate the properties of the molecules, such as the molecular weight, the molecular volume, and the molecular energy. The sixth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the crystals. It is shown that the theory of the structure of the atom can be used to calculate the properties of the crystals, such as the crystal structure, the crystal density, and the crystal energy.

The seventh part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the liquids. It is shown that the theory of the structure of the atom can be used to calculate the properties of the liquids, such as the liquid density, the liquid viscosity, and the liquid energy. The eighth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the gases. It is shown that the theory of the structure of the atom can be used to calculate the properties of the gases, such as the gas density, the gas viscosity, and the gas energy.

The ninth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the solids. It is shown that the theory of the structure of the atom can be used to calculate the properties of the solids, such as the solid density, the solid viscosity, and the solid energy. The tenth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the plasmas. It is shown that the theory of the structure of the atom can be used to calculate the properties of the plasmas, such as the plasma density, the plasma viscosity, and the plasma energy. The eleventh part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the stars. It is shown that the theory of the structure of the atom can be used to calculate the properties of the stars, such as the star density, the star viscosity, and the star energy.

The twelfth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the universe. It is shown that the theory of the structure of the atom can be used to calculate the properties of the universe, such as the universe density, the universe viscosity, and the universe energy. The thirteenth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the future. It is shown that the theory of the structure of the atom can be used to calculate the properties of the future, such as the future density, the future viscosity, and the future energy.

FRUIT NOTES - June, 1939

W. H. Thies
Extension Horticulturist

The Apple Outlook

The June 1 condition of the U. S. apple crop was reported as 69% of normal compared with 55% a year ago and the 10 year average (1928-1937) of 64%. The condition in New England is reported as 81% normal compared with 75% a year ago and the 10 year average of 77%. There was a heavy bloom in Ohio with some frost injury. Conditions in New York, New Jersey and Pennsylvania are quite favorable. A retarded blooming period avoided late spring frosts and the dry weather during May was favorable for spraying. Conditions in Illinois are good. Apples were injured by early April freezes in some parts of Missouri. In Delaware and Maryland, cold, wet weather has reduced the crop of Delicious and Stayman. In Virginia and West Virginia where a heavy crop was expected this year, late frost and unfavorable weather have reduced the prospects materially. In the South Central states, Tennessee, Arkansas and Kentucky, prospects were reduced by spring frosts. In the Northwest, the prospects are slightly below average. The bloom was irregular and the weather has been unusually dry. In Washington the set of Delicious and Winesap is variable and in Oregon rather light crops of Delicious and Newtown are expected. In California prospects are above average. The prospects in Montana are favorable while the Idaho crop is well below average.

What is Meant by a "Normal" Crop?

We are indebted to G. W. Westcott, Extension Economist, for this explanation of the term "normal" as applied to crop estimates. In the early years of crop reporting the Department of Agriculture considered "average crop" and "normal crop" as practically synonymous terms. Undoubtedly the early statisticians hoped to be able after a few years of experience to calculate an average crop which could be used as a basis for interpreting the condition figures that were collected the first of each month during the growing season. In a report dated September 10, 1884, the following statements are made. The standard of comparison, 100, in reports of condition of growing crops means that the plants occupy the ground fully, exhibiting a complete "stand", that they appear in full healthfulness, uninjured by disease or insects, and that they have a medium growth for the date at which the report is made. It means a condition of full development that can only be exceeded by some luxuriance of growth.

A normal condition is not an average condition, but a condition above the average, giving promise of more than an average crop. Furthermore, a normal condition does not indicate a perfect crop, or a crop that is or promises to be the very largest in quantity and the very best in quality that the region reported upon may be considered capable of producing. The normal indicates something less than this, and thus comes between the average and the possible

maximum, being greater than the former and less than the latter. The normal may be described as a condition of perfect healthfulness, unimpaired by drought, hail, insects, or other injurious agency, and with such growth and development, as may be reasonably looked for under these favorable conditions."

The "normal" as used by the U.S.D.A. has been criticized by eminent statisticians on the ground that it has no definite statistical basis and, therefore, by itself, cannot convey any meaning. But it has been found that the crop reporter does have a well defined idea of what constitutes "normal" for his locality. Representing the mass judgment of a multitude of observers, it adjusts itself slowly and naturally to any actual trends in yields per acre, such as might arise from development of improved strains of higher yielding seed or the introduction of a plant pest. The experience of the official statisticians of countries or states where the average is used as a basis for comparison, indicates that the farmer really makes his comparison with the "full crop" or "normal" rather than the average. The farmer tends to remember the best crops or the usual crops and does not always take into consideration the years when the crop failed.

Peach and Pear Prospects

The peach crop in New England this year is expected to total 247,000 bushels compared with 274,000 bushels harvested last season, and 333,000 bushels for the 10 year average, 1928 to 1937. The lighter crop prospect is largely due to tree losses caused by the hurricane. There was little damage from spring frosts. The outlook for pears is 136,000 bushels compared with 170,000 bushels last year and 159,000 bushels for the 10 year average. Pear crop prospects are lighter than a year ago in all of the New England states, except Vermont. As with peaches, the reduced prospects for pears are due quite largely to tree losses caused by the hurricane.

Ladino Clover as a Cover Crop

With something like 1200 acres of Ladino clover now growing in Massachusetts, dairymen are very familiar with this plant for pasture purposes. Numerous demonstrations have been established by R. W. Donaldson, Extension Agronomist, among Massachusetts dairymen. Little has been done, however, in the growing of Ladino clover as an orchard cover crop. In the June 15 issue of Seasonal Fruit Notes prepared by H. A. Rollins of Connecticut, we find this interesting statement. "Fruit growers who have been using one or two pounds of Ladino Clover seed in their orchard seeding mixtures during the past 3 years have been very well pleased with the results of this relatively new legume. Ladino Clover is proving to be one of the best cover crops for Connecticut orchard soils. For further information see the enclosed material on orchard cover crops."

The use of Ladino clover and orchard grass in combination is suggested with this word of explanation. "Ladino is a giant strain of perennial white clover. It makes a large, quick growth, remains vigorous throughout the summer and is an excellent nitrogen collector. A crop of Ladino will collect far more nitrogen than any orchardist can buy in commercial materials. If the soil is prepared as suggested above and the crop cut two or three times a year the stand will remain good several years, probably for an indefinite period. Orchard grass withstands shade better than any other large grass and is tolerant of many adverse conditions. It does not compete with Ladino so much as the

turf forming types, such as red top and blue grass. A pound or two of Ladino per acre will produce a good stand. A moderately thick stand of orchard grass will not compete seriously with the clover. Two pounds of Ladino and five pounds of orchard grass are excellent. Some seeders do not handle these seeds well together and separate seeding may be worth while."

Peach Moth Parasites

An interesting demonstration in the rearing of a beneficial insect is now under way in one of the basement laboratories of Fernald Hall. Here, A. I. Bourne, Station Entomologist, is preparing for distribution to Massachusetts fruit growers a number of colonies of the *Macrocentrus* parasite of the peach moth. This work is being carried on in cooperation with entomologists in New Jersey where about 150,000 strawberry leaves containing an infestation of strawberry leaf roller have been obtained. As the leaf roller moths emerge they fly to the only source of light in the room, a screened window. The same is true of the adult *Macrocentrus* which incidentally parasitizes the strawberry leaf roller as well as the peach moth. An electric hair dryer is the ingenious device used for collecting separately the two kinds of insects on the screen. The *Macrocentrus* are assembled in colonies and stored at 40 to 45 degrees until liberated in the peach orchard. The humidity of the collecting room is kept at 80 to 83 percent. To insure maximum activity in the orchard the parasites are carried in iced containers to the point of release. It is interesting to find that the introduction of strawberry leaves from New Jersey between June 3 and 20 where the season is considerably earlier than ours, makes it possible to assemble the colonies of parasites for our peach orchards about 3 weeks earlier than would be the case if the strawberry leaf rollers were obtained locally.

Granville Grower Solves Deer Problem

Karl Hanson, who owns an orchard in the town of Granville, has constructed a wire fence which seems to exclude deer in a section where much damage has been done in previous years. Mr. Hanson had to replace many of the trees in his orchard and found it impossible to get satisfactory tree growth before the deer were fenced out. The construction is briefly as follows. A barbed wire is stretched along the ground to prevent deer from getting underneath, and about 4" above that is stretched a section of woven wire, 39" high. The top and bottom strands are No. 10 wire and the rest No. 13. Above the top of the woven wire are 4 strands of heavy wire such as is used in growing covered tobacco, these strands being spaced as follows. the first, 8" above the top of the woven wire, the others 10, 12 and 14", respectively. This makes a fence about 7 feet high. Mr. Hanson has found no evidence of deer jumping such a fence, although other growers have reported them jumping as high as 8 or 9 feet. There are still plenty of deer in that locality, although this orchard has been unmolested since the fence was built about 4 years ago.

Cutting Grass in the Orchard

Should the grass in an orchard be cut once, twice, or may it be left without cutting at all? Investigators are not entirely agreed on this point. If the growth of grass is scanty there is reason to believe that it makes little difference. But if there is a heavy growth of grass cutting at least once before July 1 will theoretically conserve some moisture by partially

smothering new growth and preventing evaporation from the surface of the soil. From the standpoint of returning mineral elements in available form, the earlier the grass is cut the better, as evidenced by the vigor of trees growing in a regularly cut lawn.

Another viewpoint is expressed by W. G. Colby, Research Agronomist. He says, "I am inclined to think that a heavy crop of grass cut after seed stalks have matured would provide a more efficient means of conserving moisture than not cutting the grass at all. It is quite important, however, that the first cutting be delayed until seed stalks are well matured. This growth stage more or less represents the end of a growth cycle. There is less tendency to produce a vigorous aftermath growth when cut at this stage than if cut earlier. There has been a good deal of experimental work done on height of cutting of grass with respect to yield of dry material but in no instances, so far as I know, has the problem of moisture conservation or utilization been considered."

FRUIT GROWERS' FARM AND HOME WEEK MEETINGS AT THE COLLEGE THURSDAY AND FRIDAY, JULY 27 AND 28.

Items From Here and There

First Apple Maggot Flies. Two apple maggot flies were found in the emergence cages at Waltham June 26 by W. D. Whitcomb. These are the first maggot flies reported this season.

Wanted - 10 Red McIntosh Trees. This doesn't mean exactly what it says. Instead of wanting the whole tree we want only a little bud wood from trees bearing solid colored or blushed apples, for propagating new trees in August. Several such trees have been located and a comparison of their merits will be made. If you have one or more trees bearing apples of superior color and are willing to provide a bud stick or two, a post card to J. K. Shaw, Pomology Department, will be appreciated.

Successful Strawberry Field Day. About 75 strawberry growers assembled at the College in the afternoon of June 20 to look over the variety test plots and discuss problems involved in getting large yields of quality berries. The attendance was unusually good considering the rainy weather. One delegation came from as far away as Bristol County.

New Storage Bulletin. A new publication (Bul. No. 360), "Farm Storages for New England Apples," by C. I. Gunness, W. R. Cole and O. C. Roberts, is now available. A copy may be had from your county agent or from the State College.

Two Interesting Gadgets. Yankee ingenuity is still fairly common in Massachusetts. Leo Rice of Wilbraham has devised a spray tank filler by mounting a small pump, similar to that used by the telephone company, on the front bumper of his truck which carries a supply tank. The pump is attached to the truck motor and makes possible the filling of the tank from a brook or pond in short order. Raymond Fiske of Lunenburg, instead of using a wooden frame or barrel for support in spraying from the top of the tank, has mounted an automobile tire at that point, thus providing a rubber bumper effect for weary bones.

More Twilight Meetings. Worcester Co., July 11, 12 & 13. Bristol Co., July 12. Plymouth Co., July 13. Franklin Co., July 17. These meetings offer a good opportunity to discuss apple maggot control and other timely problems.

Hurricane Damage in Peach Orchards. A recent study of damaged peach trees reveals an interesting relationship between present appearance of the top and amount of root breakage. In 4 orchards studied it was found that the poorest looking trees could be shifted in various directions much more than the better trees. Evidently a peach tree will not stand as much root breakage as an apple tree. The wood is less durable and probably less capable of developing new roots when even slightly injured.

Variable Spray Coverage. The old story, scanty coverage in the top is very evident in some orchards this summer, particularly where hydrated lime or clay-containing wettable sulfur is used. At a distance the lower half or third of the tree looks fairly white while the upper part of the tree retains the normal color of unsprayed apple leaves. This difficulty is due to several things, spraying entirely from the ground, spraying on windy days, using too little pressure, and in some cases not holding the spray nozzle in the direction of the tree top for a sufficient length of time.

Curculio Injury in Sprayed and Unsprayed Orchards. If a fruit tree is properly sprayed, according to W. D. Whitcomb, a curculio beetle is likely to make not more than 4 or 5 punctures before it gets a lethal dose of poison. In an unsprayed tree it is likely to make two or three hundred punctures. This helps to explain why a badly infested orchard has so much blemished fruit in spite of a fairly well timed spray program, while the fruit in an unsprayed orchard is utterly worthless. This emphasizes the need for very thorough and timely spraying over a period of years to reduce the number of beetles in the orchard.

The Significance of Soil Color. We recently observed a newly harrowed field in which potato yields have been variable. The field is rolling and the color difference of the different areas of the soil is very noticeable. Some areas are brownish in color, the brown shading into a distinct gray or blackish gray in the low spots. This change from brown to gray suggests a difference in drainage and in aeration. Fruit plants on the gray areas would be certain to fare worse than those on the brownish areas. A nearby raspberry plantation on a similar variable soil bears out this striking soil difference.

Incompatibility of Early McIntosh and Cortland. The value of certain varieties such as Delicious for pollinizing McIntosh, is well known. It has also been demonstrated that McIntosh can be effectively pollinized by its relatives, Melba, Milton, Cortland, Macoun, Early McIntosh, etc. Only recently has it been shown that two of these relatives, Early McIntosh and Cortland, are incompatible, one with the other. In other words, Early McIntosh will not satisfactorily pollinize Cortland, and vice versa. So far as is known, however, cross-compatibility exists with the other McIntosh relatives. This new fact concerning Early McIntosh and Cortland is reported by Weeks and Latimer in the 1938 Proceedings of the Am. Soc. for Hort. Sci. The failure of these two varieties is associated with a very restricted growth of the pollen tube.

Foreign Fruit Prospects. According to the Foreign Agricultural Service of the Department of Agriculture, present indications point to fruit crops considerably above the average in the United Kingdom and in Continental Europe. The report further states. "Should favorable climatic conditions continue in European producing areas during June, American exporters may expect considerably more competition during the 1939-40 season particularly for apples and pears."

L. Southwick

Modernizing. Cultural practices continue to show improvement in the producing sections in the Danube Basin. For instance, in Bulgaria, government specialists supervise practically all planting, pruning and spraying operations. They even furnish free of charge the necessary spray materials and the spraying machinery. In Yugoslavia, additional cold storage plants are under construction. In Hungary, new regulations for packing the expected large crop are being prepared. (From Foreign Agricultural Service). L. Southwick

Summer on Schedule in Spite of Late Spring. An example of a retarded spring catching up with itself as a result of a few warm days is well illustrated in a May 8 report of Fruit Insect Developments from Ithaca, N. Y. The report says, "Maximum temperatures of 86 degrees F. on May 6 and 89 degrees F. on May 7 have worked wonders as far as tree and insect developments are concerned. What was a 2 to 3 weeks behind-schedule-season on May 5 is now (May 8) 'on time.'"

High Color - more Vitamin C. In a recent issue of the Rural New Yorker, H. B. Tukey makes this interesting observation, "You have heard that the best apples are in the tops of the trees and that the brightest red apples are the best? Now it seems that science agrees and says that the sunny side of an apple contains more vitamin C than the shady side. Further, the periphery or outer portion of the fruit has a greater vitamin content than the central portion. Perhaps there is something to this idea of being 'sun-kissed' after all!"

Retention of Lead in Rats. A detailed study of this question is reported in the January number of the Jour. of Ind. Hyg. & Tox. by Shields, Mitchell and Ruth of the University of Illinois. Among other things, they find that mature rats will not accumulate lead in their bodies at an appreciable rate until a certain critical concentration of lead in the food is reached. This critical concentration lies between 32 and 48 milligrams per milligram of dry food. These investigators have also fed diets containing various combinations of apple powder and lead arsenate. Beneficial results from the feeding of apple powder are reported.

A Square Deal Without "Square Apples." A campaign is underway in the Wenatchee district to do away with "unnecessary and unwarranted mashing of apples in the packing shed." An attempt is being made to prevent a higher and higher bulge as the fruit leaves the packing house. The contention is made that there isn't the slightest reason for putting 45 lbs. of apples into a box and then stamping them with a 40 lb. stamp. Very often apples are not of uniform firmness and when they are squeezed together in the lidding presses, the harder ones make virtually square apples out of the softer ones.

Heavy Codling Moth Infestation in the Northwest. Growers are already predicting the heaviest codling moth infestation ever known in Wenatchee and Okanogan orchards. This is based on early season high temperatures and the unprecedented number of moths caught in traps. Some growers are predicting 4 major broods of worms to contend with. In the week from May 11 to May 17, in 12 traps in the Sunnyslope district near Wenatchee, 8,891 moths were counted. Horticulturists say this is the heaviest flight on record for such an early period.

Pure Water Being Tried in Codling Moth Control. Overhead sprinklers have been installed in a Washington orchard to operate automatically during the night when codling moths usually lay their eggs. In this experiment it is hoped that a steady application of water will keep the area free or reasonably free from moths.

SUMMARY OF DEVELOPMENT AND LOCATION OF SOME COMMON APPLE INSECTS

Insect	Hibernation		First Seasonal Activity		No. of Generations	Later Activity	
	Stage	Location	Stage	Type of Injury	When Occurs	Type of Injury	When Occurs
Apple Aphids	Egg	On buds	Nymphs	Sucks sap from buds and leaves	Delayed dormant (late April or early May)	Grain and green aphid on leaves Rosy - leaves and fruit	Throughout summer
European Red Mite	Egg	On bark on under side of branches	Nymphs	Feeds on sap of leaves	About pink bud (middle of May)	Bronzing of leaves	Throughout summer-most active in hot dry weather
Tent Caterpillar	Egg & larva	In egg masses on twigs	Larvae	Eats buds and leaves	About pre-pink (early May)	None	---
Bud Moth	Larva	In cocoon on twigs	Larvae	Eats buds and leaves	About late delayed dormant	Eats leaves & makes small holes in fruit	July and August
Plum Curculio	Beetle	Under leaves on ground	Beetles	Feeding & egg punctures in small fruits	Usually 4 or 5 days after petal fall	Feeding punctures in fruit	August
Apple Red Bug	Egg	Under bark of 2-yr. old wood	Nymphs	Punctures small fruits	About blossom time	None	---
Codling Moth	Larvae	In cocoon under rough bark	Moth lays eggs	Newly hatched worms eat in- to fruit	Worms hatch about June 20	Stings skin of fruit & makes holes	August 5 to Sept. 10
Red Banded Leaf Roller	Pupa	In cocoon in leaves on ground	Same as codling moth	Newly hatched worms eat fruit & leaves	Worms hatch about blossom time	Eats leaves and skin of fruit	July and September
Apple Maggot	Pupa	In soil	Fly lays eggs	Egg punctures in fruit	About July 1	None	---
White Apple Leafhopper	Egg	In bark on twigs	Nymphs	Sucks sap from leaves	About June 10	Stipples or bleaches leaves by sucking sap	Late Aug. to Sept. 20

W. D. Whitcomb

FRUIT NOTES - July, 1939

W. H. Thies
Extension Horticulturist

Fruit Growers' Field Meeting in Marlboro, August 5

All roads lead to the John E. Rice orchards (on Route 20, west of Marlboro) for a field meeting Saturday, August 5. The program is briefly as follows:

10 a.m. - Assemble at "The Mill" on Route 20 for a tour of the orchards. This is one of the largest fruit plantations in Massachusetts. The trees are 1 to 19 years of age, half McIntosh, the rest Baldwin, Delicious and a few early varieties. A wettable sulphur spray program has been used for 5 years. There are $1\frac{1}{2}$ miles of drainage trenches dug by a steam shovel. In addition to the apple orchards there are 4000 peach trees, 1000 pear trees, and 10 acres of grapes. The orchard is equipped with a large roadside stand, a cider and grape juice mill, and a canning factory.

Noon - Basket Lunch. Caterer on grounds.

2 p.m. - Walter E. Piper, Massachusetts Dept. of Agriculture, "The Prospective Apple Crop."
Thomas M. Collins, Boston, "Apple Packing Trends on the Wholesale Market."
Earl French, New York City, "Apple Packages and Packing for Chain Stores."

The Apple Insect Situation

From W. D. Whitcomb of Waltham we have these brief comments on apple insects: "July 20-25 is usually considered the maximum emergence period of maggot flies, but to date (July 22) there have been about 100 (30%) less than the expected number of flies recovered from the bare ground cage and about 150 (50%) less from the sod cage. In general, we can assume that the dry weather is delaying the emergence (and it is dry here - even the thunder showers have dodged Waltham), but it also indicates a small emergence and consequent light infestation for the year. On the other hand, if the decreased number of flies observed is due entirely to dry weather, later rains may increase the emergence and produce an abnormally late infestation."

"Red banded leaf roller and bud moth are generally much less prevalent than last year and probably will not be the pest

Issued by the Extension Service, Willard A. Munson, director, in furtherance of Acts of May 8 and June 30, 1914, Massachusetts State College, United States Department of Agriculture, and County Extension Services cooperating.

that they were in 1938. European red mite is picking up and this dry weather is ideal for them. Its control is a difficult problem. Summer oil (3/4%) is the most effective spray but cannot be used on a heavy sulfur deposit and may give a dull finish to fruit if applied in August. Rotenone sprays kill the active stages but not eggs, and also kill beneficial insects and spiders which are more helpful in controlling late red mite infestations than they are generally given credit for. Soap, 4 pounds dry or 10 pounds of 40% anhydrous liquid in 100 gallons, seems good but has given both satisfactory and unsatisfactory results. It is safer than oil, however."

There are plenty of apple maggot flies in some orchards to cause heavy infestation, as evidenced by the taking of 23 flies from a small cage in eastern Massachusetts on July 24. This represented about a week's emergence from an area of approximately 4 square feet where some maggot infested apples were dumped last fall.

The absence of rain between July 10 and July 25 in most parts of the state resulted in more than the usual amount of protection from the Third Cover spray. The July rainfall record in Amherst up to July 31 is as follows: The number in parenthesis indicates inches of rainfall. July 8 (.17), 14 (.76), 27 (.14), 28 (.07), 29 (.64), 30 (.18). Total 1.96 inches, or less than half the normal July rainfall, 4.1 inches.

A Few Facts About Oriental Fruit Moth

Peach growers will be interested in these items concerning the behavior of the Oriental fruit moth, furnished by A. I. Bourne.

The moths begin to emerge about the middle of May and continue until about the middle of June. There are three broods and sometimes a partial fourth during the season. The life cycle in mid-summer requires 32 days. The first brood is responsible for injury in the tips of the twigs. It attacks the twigs alone. The second brood attacks twigs and fruit. The third brood attacks the fruit alone.

First brood larvae feed from late May through June. Second brood larvae feed from early July to mid-August (some hibernate). Third brood larvae begin feeding about the middle of August (most hibernate). If a fourth brood appears, the larvae feed from September on.

Moths begin laying eggs a few days after emerging and lay for 7 to 10 days. They are active toward dusk on warm days, much the same as codling moth. Each female lays from 36 to 50 eggs, occasionally up to 70 eggs. The eggs hatch in 4 to 6 days if warm and 7 to 14 days if cool. In late season the time is about 21 days. The pupal stage requires only 2 to 4 days in hot weather (1st and 2nd brood) and up to 11 days later.

The adult life of the *Macrocentrus* parasite is about 26 days while the adult life of the Oriental fruit moth is slightly longer. Low temperatures inhibit the activity of the parasites. Below 60 degrees F. they are inactive. From 65 to 80 degrees they are active in parasitizing the Oriental fruit moth.

Echoes of Farm and Home Week

The fruit growers' F. & H. Week sessions held at the State College July 27 and 28 were well attended, about 100 to 150 growers appearing at each session. Interest was well up to that of former years. Among the highlights were an inspiring talk by G. B. Hitchings of New York State on his experiences of the past 50 years, a thought provoking discussion of consumer packages by John Wanhope of the Dept. of Agriculture and Markets at Albany, two talks by W. H. Upshall of Ontario on his work with fruit problems in Canada, and a summary of the organic matter situation by J. B. Abbott of Vermont.

Without attempting to abstract the various talks in this issue of Fruit Notes the more important comments of two of the talks are here presented. Mr. Hitchings, a pioneer in the sod mulch system of orcharding, insists that any practice which does not prove profitable in his orchard is promptly abandoned. In recent years he has cut out several sections of his orchard where soil conditions are unfavorable. He has discontinued the use of lime sulphur almost entirely in recent years. He grows only as many McIntosh as he can handle efficiently. Northern Spy, Gallia Beauty, and a few other varieties make up the balance. Several years ago he planted Duchess and Early McIntosh together, intending to cut the Duchess out. He is still unconvinced that the Early McIntosh is more profitable. He has had excellent results with some of the newer materials as a dormant spray for bud moth, rosy aphid, etc. Five to 25 years is the most profitable bearing period. New trees are planted with peat moss. The second year they are given 2 lbs. of nitrate of soda each. The pruning is done the first year with little more until the tree is 8 years of age. He has only $\frac{1}{2}\%$ tree breakage from weak crotches. Believes in replacing the orchard after 40 years.

Professor Upshall, speaking on peach growing in Ontario, recommended a sandy or sandy loam soil where the clay layer is at least 5 feet below the surface. If peach branches make an angle of less than 30 degrees with the trunk there is almost certain to be breakage. He recommends planting trees at least 4 feet tall. These should be pruned back almost to a whip. At least 4 main branches should be left and those not wanted should be removed. 20 x 20 feet is a good planting distance. There should be no cultivation after the month of May. Organic matter is important in a peach orchard. Weeds often make a good cover crop. A peach should be left on the tree until it loses its green ground color. Such fruit is found to ship very well even up to a distance of 1000 miles. A peach tree is a very heavy feeder and must be treated accordingly. There is a tendency toward lighter pruning. Heavy pruning increases the size of fruit but means poor color and a smaller crop. A grower should have a succession of varieties for a two-month period. This tends to discourage the practice of picking a late variety like Elberta before it is fully mature.

New Control Methods for Peach Pests

Experimental work in recent years has brought to light three important control measures of interest to the peach grower, first, the introduction of parasites for the control of Oriental fruit moth, second, the destruction of choke cherries to prevent the spread of X-disease and third, the use of ethylene dichloride for peach borer control.

This latter material promises to replace the familiar Paradichlorobenzene which has been commonly used for a number of years. It has several advantages over the older material, being effective at low soil temperature and so can be used later in the season than Pdb. It appears to be safer on young trees and acts more quickly than Pdb. Furthermore, it requires little previous treatment of the soil and no subsequent treatment. As a final advantage, it costs a little less than Pdb.

The ethylene dichloride emulsion may be prepared cold by stirring 9 parts by volume of the material in 1 part by volume of potash fish-oil soap. A good grade of potash fish-oil soap should be used, that is, one without an excess of caustic potash and containing approximately 30 percent of soap and 70 percent of water. (Complete details concerning the preparation and use of this material may be obtained from your county agricultural agent or from the State College.) Best results are obtained by applying in the fall, after egg-laying has been completed and when many of the borers are small. The emulsion is applied at different strengths for trees of different ages, the strength varying from $7\frac{1}{2}\%$ for 1 year trees to 25% for trees 6 years old or older. Peach growers in Massachusetts will do well to examine all peach trees for borers this summer, and if present obtain the details of this promising new treatment. A local source of the materials may also be obtained on request.

Present Status of Salvaged Trees

During the past few days the writer has visited a number of orchards where apple trees were damaged by the hurricane. Treatment in these orchards varied from nothing at all to thorough anchorage plus mulching and watering. These latter trees look very promising at the present time in spite of serious root breakage last fall. Foliage on the injured side looks surprisingly well and many of these trees are carrying a fairly good crop. Incidentally, a retentive soil type may be partially responsible. In other orchards there is a distinct difference in size and color of leaves on normal trees as compared with damaged trees. This is to be expected. All of our observations show that an apple tree is able to obtain its water supply from a comparatively small number of roots. There is reason to believe, however, that it cannot obtain a supply of nitrogen in each branch unless it has roots directly supporting each branch. The need for the development of new roots in this connection is readily understood. Where trees were mulched before the dry spell they look very well, on the average. Even late mulching is better than none at all. Any grower with damaged trees worth salvaging is missing a good bet if he fails to mulch thoroughly and generously, using whatever

material is available, including hay, straw, weeds, and even sawdust. Mounting piles of sawdust along many roadsides suggest a new source of mulch material which should not be overlooked.

Some Stray Thoughts Concerning Strawberries

Again we come to the season of good intentions in the matter of placing strawberry runners. Recent rains have stimulated a vigorous growth of new plants in many plantings which should receive attention very soon if the plants are to be properly spaced for 1940. Dorsett, Fairfax and Catskill, along with other strong feeders, are very much in need of good spacing if satisfactory yields are to be obtained. The best system of spacing depends partly on the spacing of mother plants. In the Falmouth section the mother plants are set about 14 inches apart and the spacing is accomplished by allowing each of these plants to develop 4 daughter plants, 2 in either direction at right angles to the row. At the College we practice a wider spacing of the mother plants with a subsequent development of 14 properly spaced daughter plants from each mother plant. The main thing is to insure each new plant an adequate volume of soil and thus prevent the extra plants from becoming "weeds" in the row.

Another matter in connection with the strawberry business which is worth considering is briefly this. Anyone interested in harvesting a crop of strawberries in 1941 should "take time by the forelock" and get the prospective plantation in the best possible condition for setting next spring. Subduing all weeds, as for example, by growing a hoed crop, and incorporating plenty of mineral elements and of organic matter in the soil are some of the things worthy of attention. If the area to be planted next spring is in any sense of the word lacking in fertility or in organic matter, there is no better time to remedy the situation than in the year preceding setting the plants. Some of the best strawberry fields we have ever seen have had 2 or 3 cover crops plowed under before setting the plants. Others have had a liberal application of manure. Strawberry growers are firmly convinced that good yields depend primarily on good plant growth the first season. If we get good plant growth and mulch the planting well in November there is seldom need for additional stimulation in the spring of the bearing year.

Two Examples of Doubtful Diversification


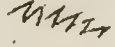


In recent weeks two orchards of several hundred trees each on diversified farms have come to our attention. The first one is located on a large dairy farm and has cost the owner more than \$2000. The trees are about 12 years of age and the soil and site are above average. Tree vigor is reasonably good considering the fact that the orchard is little more than a hay field. No spraying equipment is available on the farm. One or two sprays only are applied during the season. Needless to say, this orchard has returned practically nothing and will continue to perform in that way unless the owner becomes sufficiently fruit minded to put first things first and apply a thorough going spray program. Un-

less that is done the investment up to the present will be lost and any additional expenditure will be like dumping dollars in the lake. The unfortunate thing is that the owner of this orchard has continued year after year to go part way in the enterprize, wasting time and money without any hope of getting a successful crop.

The second orchard no longer exists. It involved an expenditure of \$1500 and was located on a widely diversified farm including dairy, poultry and vegetables. It was impossible to apply certain sprays at the critical time because the men were generally busy elsewhere. As a result, the fruit was always badly blemished by curculio or too scabby to find ready sale on the market. To say that such an orchard was a constant headache to the owner is putting it mildly. There was no hope of managing the orchard properly with so many other irons in the fire. Seeing his mistake, he certainly did the right thing in cutting the orchard down. A diversified farm is an ideal setup provided someone is responsible for doing the important things in each enterprize at just the right time. On a dairy farm certain tasks must be done today because they will not wait until tomorrow. Fruit growers realize the element of timeliness in many orchard operations. If a farmer can be both dairy minded and fruit minded to the extent of giving each enterprize the attention it deserves, all well and good. If not, diversification becomes a dubious venture.

Identifying the Choke Cherry

As an aid in distinguishing a choke cherry from related species which resemble it to some extent, J. S. Bailey has prepared this brief outline showing distinguishing characteristics. The chokecherry is a source of X-disease. The others are not.

Common name	Black cherry Rum cherry	Choke cherry	Pin cherry Bird cherry
Scientific name	Prunus serotina	Prunus virginiana	Prunus pennsylvanico
Leaf serrations	dull 	sharp 	sharp
Dots on stem	numerous, small	few, large	numerous, small
Pubescence (fuzz) along mid rib of older leaves	present	absent	absent
Leaf shape	long, narrow	shorter & broader than serotina	long, pointed, narrow
Fruiting habit	raceme 	raceme	umbel 
Ripening season	late summer	mid summer	mid summer

Items from Here and There

More Moisture Under Grass Mulch. In sod orchard experiments in Door County, Wisconsin, the best soil moisture conditions were found where heavy fertilization caused a vigorous early growth of grass which formed a thick insulating mat in summer. --R. A. Van Meter.

Boysenberry Not so Good in Wisconsin. Wisconsin Horticultural Society trials of Boysenberry for three years indicates that while it may survive winter in some sections when covered heavily, it does not seem to produce a crop the following year. (From Apr. Wis. Hort.).

More for Less. Although farmers purchased 6 per cent less tonnage of fertilizer in 1938 than they did in 1928, they got 2 per cent more plant food, while their total expenditures for fertilizer were 30 per cent less.

Conn. Growers Visit N. H. and Me. Connecticut fruit growers have planned a tour of orchards in New Hampshire and Maine on August 1, 2 and 3. On August 11 a field day is scheduled for the Root orchard in Farmington and on August 16 there will be an Experiment Station Field Day at Mount Carmel.

Growth of Lemons Shows Moisture Content of Soil. Recent soil and fruit measurements in California show that changes in apparent growth rate of lemon fruits serve as an excellent index of the relative water deficit of the tree, thus providing an indicator of irrigation needs. In the Northeast we have a similar situation in certain orchards where apples and other fruits stop growing in dry weather.

Recently Introduced Fruit Insects. During the past 25 years not more than 3 or 4 fruit insects of any consequence have been introduced and become established in the Northeast. They include European red mite, Oriental fruit moth, apple leaf curling midge, and farther south the Japanese beetle. The apple and thorn skeletonizer also came during this period but can scarcely be called a pest of major importance.

Each Fruit Planting Has Its Problem. During a recent week of farm visits the writer came in contact with no less than 20 different fruit problems of individual concern. They include a severe case of raspberry worm (Byturus beetle), an infestation of pear midge which destroyed the crop on certain trees, yellowing of Greening and Baldwin leaves, and the loss of peach trees from a number of causes. Truly the fruit business is a complicated one and the particular problem which bothers one grower may not be at all general. To ferret out the important items and to apply suitable remedies without excessive expense is a task which constantly faces the fruit grower. Sometimes we worry about imaginary difficulties and overlook the real thing.

W. H. Thies
Extension Horticulturist

The Internal Cork Situation

A mid-summer drought has again resulted in some browning around the core of certain varieties of apples where grown on less favorable soils. This condition has been observed in at least 20 widely scattered Massachusetts orchards and has also been reported in Rhode Island and Connecticut. The injury ranges from a tinge of brown to irregular corky areas extending from core to skin. Only in the more seriously affected fruit can the damage be detected without cutting the apple. Apples with much internal cork generally have a roughened or pebbly surface.

The relation of internal cork to the subsoil on which the tree grows is well established. Where the tree is shallow rooted because of an impervious hardpan, ledge, or high water table at certain seasons the fruit is subject to the development of internal cork. Also, where the tree is underlain by coarse sand or gravel incapable of retaining enough moisture for an extended dry spell, internal cork is likely to appear. Varieties most commonly damaged are McIntosh and Cortland, although some rather "corky" Baldwins have been observed this season.

A careful survey of the extent of internal cork in a number of Massachusetts orchards shows much variation even in adjacent trees. We sometimes find a tree with normal fruit within 20 feet of a tree bearing "corky" fruit. And in some cases certain limbs show much more internal cork than the rest of the tree. One grower reports finding internal cork only in those trees along a hard packed driveway where rain water fails to penetrate. This suggests a moisture relationship. Little relation to hurricane damage has been noted. One would think that a tree with injured roots would necessarily suffer in a dry season. But the soil type seems to be a more important factor. A comparatively few roots are apparently capable of supplying the top with water provided the soil is deep, well drained and retentive.

This brings us to the question "What can we do about it?" Unfortunately, there is little we can do to improve the present season's crop. But we ought to examine apples in all parts of the orchard to locate the affected trees in order that fruit showing internal cork may be kept separate from normal fruit. Then the "corky" fruit should by all means be kept off the general market. Our McIntosh reputation is in danger if we sell fruit of that variety showing internal cork for anything but what it is - a very inferior apple. One needs only to eat a "corky" apple to appreciate how inferior it is and how necessary that we inform the buyer of the actual situation. We often talk about keeping inferior fruit off the market. Here is an excellent place to start, in company with McIntosh growers in other New England states.

Next spring all susceptible orchards should be given a light application of borax, applied either on the soil or as a spray on the foliage. The amounts will be announced when the proper season arrives. Striking results have been obtained from such treatments made in previous years. In no orchard

receiving borax within the past three years have we observed any internal cork this fall. Evidently, a dry season influences the availability of boron in the soil. The very small amount required by the tree seems to be lacking where there is a scanty supply of water.

An Experiment in Transplanting Bearing Trees

Thirty-two apple trees of bearing age were transplanted in Vermont in 1933 and 1934. The behavior of these trees in the meantime is reported in Vermont Bulletin 432, "A Study in Recovery of Transplanted Apple Trees," by M. B. Cummings and R. G. Dunning. The authors' report that growth was hindered, development retarded, and fruit production deferred. Leaf numbers were decreased from 54% for nine-year-old trees to 80% for three-year-old trees in 1937 and from 32% for four-year-old trees to 75% for six-year old trees in 1937. The yield record of these 32 trees for a three-year period following transplanting was 196, 230 and 2,043 apples respectively, while 31 check trees unmoved bore 2,087, 1,576 and 9,731 apples. The hardier varieties, Cortland, Lobo, Joyce, etc., bore most of the fruit. The less hardy trees bore very little. As a result of this experiment this opinion is expressed by the authors: "Transplantation is best carried out under northern New England conditions if a compact root system is developed, if good soil is firmly packed about the roots, if done early in the spring or fall on cool, moist, lowery days, if soil water basins are constructed, adequate watering done, mulches made, nitrate applied to stimulate new growth and mechanical injuries avoided."

A "Red" McIntosh Comparison

To compare the merits of the various red or blushed strains of McIntosh found growing in Massachusetts and elsewhere an interesting project is under way at the State College in Amherst. Bud sticks have been obtained from about 15 individual trees which bear noticeably better colored fruit than the average McIntosh tree. Some of these trees have been under observation for a number of years and undoubtedly are much superior to the average run of nursery trees. In addition to several bud sticks from out of the state, budding material has been obtained from orchards in Granville, Conway, Shelburne, Warren, Brimfield, Richmond, Acushnet, and a few other towns.

For budding purposes one of the so-called Hatton stocks (clonal stock No. 9) is being used to avoid the variation found in mixed seedlings. This will enable us to make a fair comparison of these different red strains on a vegetatively propagated stock. Within a few years it should be possible to compare the fruit of these strains growing side by side. And when the merits have been carefully sifted it will be possible to furnish budding material to nurseries in order that growers may obtain a better than average McIntosh.

Peach Borer Control Demonstrations

Demonstrations in the use of Ethylene Dichloride for peach borer control are scheduled for two middlesex County orchards, the Kimball orchard in Pepperell and the Greene orchard in Ashland within a few days. This new material is proving successful and is likely to replace to a large extent the older material, Paradichlorobenzene. It is now possible to obtain from a New England dealer a 50% stock emulsion which needs only to be diluted before application. The source of this material and prices in gallon to 50 gallon lots may be obtained on request to the writer.

ITEMS FROM HERE AND THERE

Golden Delicious from Washington. Golden Delicious apples are coming from the Yakima Valley of Washington in boxes with individual compartments for each apple, like an egg crate. The variety as grown there shows bruises too easily to be handled in the ordinary western box. R. A. Van Meter

Some Interesting Data on Perishable Products. The average carlot haul of fruits and vegetables throughout the U. S. has been found to be 1425 miles. It has been estimated that 225 kinds of food are canned each year in the U. S. About 9 billion cans are used each year. At least 14 different fruit juices are now on the market.

R. A. Van Meter

Frozen Fruits in Storage. Total stocks of all frozen fruits on August 1, were reported as 130,650,000 pounds, an increase over July 1 of 26,540,000 pounds. Of the August 1 holdings 21,172,000 were reported as unclassified. 32,196,000 pounds were in small containers of less than 30 pounds capacity and the balance in bulk or containers of 30 pounds or over.

A Note on Pruning Cortland Trees. In a recent issue of Maine Fruit Notes J. H. Waring suggests this solution to the Cortland pruning puzzle voiced by a Connecticut grower in the Rural New Yorker: "Carry the leader to a height of some 10 feet, permit somewhat more branches to remain than the four or five which would be good practice with McIntosh, and exercise constant care to keep all branches in balance and properly subordinate to the leader at least until well established. The later removal of some bottom branches will not then entail any serious loss; the trees will still have good size and balance."

An Organic Matter Sermon Worth Repeating. J. B. Abbott in a recent issue of the Farm Bureau News makes these pointed statements about organic matter. "If all the accumulated soil-management wisdom of a hundred generations of master farmers were boiled down to just three sentences, one of those sentences certainly would be 'provide for regular and frequent replenishment of the supply of organic matter in the soil.' Organic matter in the form of humus adds to the waterholding capacity of the soil, thus reducing the danger of injury by drought, it serves as a storehouse of readily available plant food, especially nitrogen, and yields it up to the plant with a season-long regularity never achieved by fertilizer alone; it improves the tilth of the soil, making heavy soils more friable and giving sandier soils more body, it increases the permeability of the soil so that rainfall is more quickly absorbed and run-off and erosion correspondingly decreased, it serves as a culture medium for the soil bacteria which render plant foods available."

Phosphorus - The Master Key. This is the title of an article by W. H. Pierre of Iowa State College in the latest Fertilizer Review. He says, "When the mixed pasture that looks green enough during rainy weeks shows on examination that no clovers have come up and that the sod is thin, it is an indication that phosphorus is one of the elements in which the soil is deficient. For legumes are particularly sensitive to a lack of available phosphorus." This doctrine seems to apply in the orchard. Fruit trees seldom fail where legumes make satisfactory growth. Phosphorus is one of the elements found in every living cell. It is essential in both plant and animal nutrition.

Overcoming a Toxic Condition in the Soil. After several years of heavy applications of lead arsenate in Washington orchards, the soil is showing distinct harmful effects of an accumulation of arsenic. Experiments are under way to test the effect of different materials, including barnyard manure and various chemicals as a means of correcting this condition. Several of these materials have released and caused to leach out relatively large quantities of soluble arsenic but they have not removed enough of this material to benefit materially the growth of cover crops such as barley and alfalfa. Heavy applications of ferrous sulfate and of ferric sulfate, however, have proved very effective in reducing the concentration of readily soluble arsenic in arsenic toxic soils and have resulted in a greatly improved cover crop.

Effect of Sulfur Fungicides on Apple Leaves. Cornell Memoir 222 reports an interesting experiment in which apple leaves were sprayed with various fungicides and the effect on photosynthesis then determined. Here is one interesting item found in the bulletin summary, "The principal reduction in the apparent photosynthesis of apple leaves due to lime-sulfur solution, with and without arsenate of lead, occurred when the lower surfaces of the leaves were sprayed. The reduction from spraying the lower surfaces only, or from spraying both surfaces, was approximately 24 per cent, and the reduction from spraying the upper surfaces only was about 5 per cent." This is to be expected since the stomates or pores of an apple leaf are found only on the under side.

McIntosh Color Requirements are Too Low. The color requirements for McIntosh are too low, according to Cornell Memoir 220, "Joint Correlation Applied to the Quality and Price of McIntosh Apples," published in March, 1939. After a detailed study of the various factors which surround a McIntosh apple and of their relation to market price, the author, J. R. Raeburn, says, "The relationships of color to price indicated that apples with less than 67% of their skin 'a good red characteristic of the variety' should not be permitted in the 'United States Fancy' grade, and those with less than 33% should not be permitted in the 'United States No. 1' grade."

A Practical Method of Rogueing a Red Raspberry Planting. L. K. Jones in Washington Extension Circular No. 22, "Red Raspberry Mosaic," makes these suggestions about getting rid of infected raspberry plants: "When mosaic infected plants are dug the following precautions should be observed. The diseased plant and one healthy plant on each side should be dug as soon as noted in spring or early summer. The plants should be carried out of the planting as soon as they are dug. Following the digging, careful inspections of the planting should be made every two weeks. Any suckers coming from roots of plants that have been dug should be destroyed since the disease will live in the roots and come up in any new growth that develops. Mosaic-free plants may be used to fill in the vacant areas in the rows one or two years after the diseased plants have been removed, providing all sucker growth from the old roots has been destroyed."

Red Sports are Often Picked Too Early. W. E. Piper reports a well known Boston dealer as saying "A green Red Grav is worse than a green Green one." This seems to suggest a tendency among growers to pick red sports too early. If we harvest a Red Grav, Richared or other red sport as soon as it takes on a red color, we are sure to have a less edible apple than the color would indicate and about the only thing worth less than an immature, rubbery apple is two such apples.

W. H. Thies
Extension Horticulturist

F.S.C.C. Program Gets Underway

Plans have been completed for the purchase of surplus apples in New England by the Federal Surplus Commodities Corporation. Headquarters have been established in Concord, Mass. in charge of Roy D. Flato, Purchasing Agent of the F.S.C.C. In addition to a state committee each apple producing county has its county committee to arrange details with individual growers. Following are the essential items of the program. Two grades only will be purchased, U.S. No. 1 and U.S. Combination. The size for most varieties is $2\frac{1}{2}$ " and up although a $2\frac{1}{4}$ " size is also specified for McIntosh and Jonathan. Purchase Announcement No. 1 from the Concord office states that 50 cars of apples are to be purchased in Massachusetts during the period October 9 to October 14. Varieties will include, in addition to McIntosh, R. I. Greening, Baldwin, Cortland, Delicious, Jonathan, Wagener and Wealthy. Other varieties may be added to the list. Apples must be packed in one of the following containers. Northeastern apple crate, Eastern standard apple box and New England lug box.

Whenever possible vendors will be instructed to deliver apples to local Distribution Warehouses. Where such distribution is not available, allocations of car-lot shipments will be made by the County Committees, and growers will deliver their apples direct to cars. When car-lot shipments are to be made cars must be loaded with only one of the three types of boxes. Mixed loads of boxes will not be accepted for car-lot shipments. Each grower is limited to a minimum of 50 packages, and no fewer than 50 packages will be accepted from any one grower.

Mr. Flato has issued this important statement to guide any grower interested in selling apples to the F.S.C.C. "In order to avoid confusion and misunderstanding after purchasing has begun, all growers are requested to keep in close contact with their respective county committees and county agents. Each county agent is a member of the committee set up in his county, and each agent and committee will be kept constantly informed of all activities of the Massachusetts program. Therefore, to save time, duplication of instructions, and possible embarrassment, it is necessary that growers direct their problems and questions to their committee members or county agents and not to the office of the purchasing agent."

Why Divert Apples From Domestic Fresh Fruit Consumption?

The commercial apple crop in the United States this year is about 103,000,000 bushels. Experience has shown that not more than 75,000,000 bushels can be moved profitably through domestic fresh fruit channels. The export market during the past several years has removed about 10,000,000 bushels from the total commercial crop. But this year on account of war conditions abroad, the

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export market is an uncertain factor. Thus we have an apple crop to be sold in this country which compares favorably with the heavy crops of 1935 and 1937. In both of those years altogether too many apples were thrown on the domestic market and as most growers remember, prices were disappointing.

There is reason to believe that apple growers in the United States would get as much for 75,000,000 of the best apples as they would if the entire crop is offered for sale on the fresh fruit market. In other words, if every grower could be induced to discard about one-fifth of his total crop (lower grades in each case) the domestic market would be stabilized and the remainder of the crop should sell at fair prices. But such a miracle is not likely to occur.

There is a general feeling in the apple industry that the growers themselves should take definite steps to improve the market situation resulting from excessively large national crops. This year for the first time we have not only a large apple crop to be disposed of but also a large citrus crop. This combination, according to the economist, is unique. We have had plenty of apples and of oranges in previous years but not such a bumper crop of both to be marketed at the same time and to the same individuals. This brings to the attention of the grower the urgent need for finding other outlets. Among the possible non-fresh fruit outlets are feeding to stock, canning, drying, juices of various kinds, dumping and not harvesting. If the apple industry is to do its part in reducing the national surplus, each individual grower should do his part in diverting lower grades of fruit wherever possible.

The F.S.C.C. program is based upon grower cooperation in that every bushel of apples sold to the corporation will have to be matched by a bushel of apples diverted into one of the non-fresh fruit channels. Thus, if the F.S.C.C. buys 10,000,000 bushels and the growers divert 10,000,000 bushels more, it will mean a reduction of about one-fifth in the amount of fruit on the domestic market. This interesting experiment in industry cooperation marks a real advance in the direction of better marketing and a stabilization of the national crop. Growers in eastern and central U. S. are largely responsible for the fluctuation in the national apple crop since our yields vary by as much as 100% from year to year while the yield in the Northwest varies by not more than 10%. Marginal orchards which produce a crop only when weather conditions are favorable contribute largely to the crop surplus. Apple growers throughout the country should give serious thought to the national aspects of the problem. It is not enough for the F.S.C.C. to salvage a few million bushels of surplus apples. Growers can cooperate very effectively to help themselves.

Feeding Apples to Livestock

In the September issue of Virginia Fruit there appeared two articles written by farmers on this subject of using cull apples as stock feed. This word of caution is in order. In beginning the feeding of fresh apples to livestock, particularly milk cows, start very gradually. Stock will eat apples very readily, but don't begin by feeding them all they will eat. S. R. Hurst of Winchester, Virginia, relates his experience as follows: "We have experimented with the feeding of fresh apples in several ways. We started with young hogs by giving them a small quantity of apples at each feeding, gradually increasing the quantity of apples and decreasing the ground feed until they were fed apples entirely with plenty of fresh water available at all times. They remained thrifty and grew rapidly. We have also fed apples to dairy cows and horses.

We increase the quantity of apples daily and decrease the quantity of other feeds until the cows consume from three-fourths to one bushel each morning and night. By the time we have reached this quantity at a feeding, we have diminished the other dairy feed to about one-third the quantity that we find necessary when apples are not available. During the season when hay is fed, each cow will consume not more than one-third to one-half as much hay over the period when apples are being fed. We find that the flow of milk increases with the feeding of apples."

Another Virginia farmer, J. B. Bonham, has used apples very effectively along with grass silage. He writes, "We decided to mix apples with the grass, allowing the ensilage cutter to handle grass and apples at the same time. We used about two-thirds grass and one-third apples. The surprising thing with us was to see how quickly a large quantity of apples disappears. We did not have half enough apples so we began to repack some that were not keeping too well. This gave us a use for specked apples. All this was done without any messy results. The most pleasing aroma you could imagine came from the mixture. We watched the results and found that the horses neighed, the cattle bawled, the sheep bleated, and the hogs rooted--all trying to get their share of this apple ensilage. We are planning to use a great quantity of apples in our corn ensilage this fall."

Some Massachusetts farmers are also reporting interesting observations on the feeding of apples to livestock. One fruit-dairy farmer has noticed that his cows come to the barn much more promptly while he is feeding apples. He says that they run the last 100 yards. Another combination farmer says his cows are receiving a bushel of apples per day with good results. Horses, too, like apples. County Agent J. H. Putnam tells us that he is feeding a half bushel per day to a pony, - and a sleeker, fatter pony you seldom see.

Mouse Population Decreases

Trapping investigations conducted by W. W. Dykstra of the Biological Survey during the past year indicate a marked drop in meadow mouse infestations. Spring checks revealed that populations were only about 10% of the 1938 peak. Fall population checks indicate that infestations are now less than 25% of the 1938 peak. Trap checks in a South Amherst orchard showed a population of 32 mice per acre as compared with a high of 300 per acre in many orchards last year. However, in hurricane damaged areas the mice appear to be concentrated in heavy uncut grass cover beneath braced trees. There is still evidence of considerable underground activity. Although populations are less, the possibility of serious injury exists, and control should not be neglected. Demonstrations in control will again be conducted throughout the state this fall. Discussions will include new tricks in poisoning, acceptance of apple varieties, status of the pine mouse, and fluctuations in the mouse population.

Meadow mouse populations, according to Mr. Dykstra, are at their lowest ebb in early spring. Alternate rain, snow, freezing and thawing weather are probably responsible for this reduction. Fifty-six per cent of the mulched trees in one orchard had mice present last fall. Trap checks in the spring indicated a drop of 92% in the mouse population. Heaviest fall mouse infestations had a survival of about 30 mice per acre this spring. A Connecticut orchard had 105 trees blown down in the September hurricane. They were pulled out in the spring, and 85 were found to have serious root injury from mice. Drifting of mice took place during warm spells last winter. Therefore, when extended warm periods take place, orchard borders may need re-treating.

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Ten Points About the Cortland Apple

This is the title of an interesting article in a recent issue of the Rural New Yorker by H. B. Tukey. He points out that three supposed characteristics of the Cortland are no longer being emphasized; namely, the similarity of Cortland and McIntosh, the long hanging qualities of Cortland, and its long keeping qualities. He also says that the similarity of tree characters are no longer stressed since the Cortland is found to be a smaller tree with a willowy habit of growth similar to the Ben Davis. Other points mentioned in this article are the susceptibility of Cortland to rosy aphid injury, the tendency of the variety to succeed in part because the trees now in commercial production are young, and that the higher proportion of low grade McIntosh on the market reflects the many older McIntosh trees from marginal orchards and from neglected orchards, whereas most of the Cortland crop is coming from young trees in relatively better tended orchards. While the Cortland, according to the author, may never be called an improved McIntosh it generally is a good all purpose apple. At the same time the claim is no longer pressed that Cortland will do well wherever McIntosh succeeds. In some northern sections Cortland quality is none too good in comparison. The final point is this. Cortland is succeeding not because of the somewhat extravagant claims made for it but because there just doesn't seem to be anything better to plant to supplement the plantings of McIntosh in eastern orchards. The variety may go into the discard when something better comes along.

Must All Drop Apples Be Picked Up?

Each season we find an occasional grower going through the orchard in late fall picking up every apple in the belief that such a practice is essential for pest control. For this reason a suggestion just now concerning the why and when of picking up drop apples may be in order. It is absolutely a waste of time to pick up and destroy or haul to a distant dumping ground any apples which do not contain larvae of such insects as curculio, codling moth and apple maggot. Late June and July is the only time for picking up drop apples containing curculio grubs because the latter are found only in the little withered fruits which fall before mid-summer. As regards apple maggot any infested apples which tend to soften readily and become mushy should be gathered up promptly (at least once a week) and disposed of in a way that will prevent the maggots entering the ground. The two commonly accepted methods of disposal are feeding to livestock promptly or emptying on an area of soil which has been previously saturated with waste crankcase oil. Codling moth larvae may be found in the apples over a considerable period although the number of drop apples infested by codling moth is relatively small in comparison with the two pests mentioned above.

It is well to remember that the apple maggot develops only in those apples which soften readily, as for example, Wealthy, Gravenstein, etc. Very few of the maggots mature in hard, winter apples like Delicious and Baldwin. Such apples may show the characteristic tunnels although a much smaller percentage of the maggots survive to emerge and enter the ground. The point we are trying to make is briefly this. There is nothing about an apple rotting on the ground to injure an orchard in any way. It actually provides a little fertility. To pick up drops in late fall is a waste of time and a needless cause of backaches. Timing is important here as it is in spraying.

ITEMS FROM HERE AND THERE

Not Too Late to Control Peach Borers. Ethelene Dichloride, a promising new material used in the control of peach borers, may apparently be applied effectively any time during October and perhaps any time before cold weather sets in. It is easier to apply than Paradichlorobenzene and no subsequent treatment of the tree is necessary. Complete instructions for applying this material along with a nearby source of the stock emulsion (a combination of the above material and potash fish oil soap) may be obtained by writing your county agricultural agent.

A Promising New McIntosh Seedling. As this is being written the writer is enjoying an exceptionally attractive McIntosh seedling apple which bears a strong resemblance to a Wealthy although the flavor is fully as good as McIntosh if not a little better. Unless this new variety shows faults not apparent in the specimen at hand, it will certainly bear watching and further testing. Judging from its various characteristics, this apple, developed by Lewis Charlton of Lunenburg, may be a cross between McIntosh and Wealthy.

Some Michigan Growers Object to New Advertising Law. In a recent poll taken on the Benton Harbor wholesale market, 30 growers were contacted and their opinions on the new law obtained. One was very much in favor of the law, 9 were non-committal, expressing a doubtful hope that the law would do some good, and 20 were emphatically hostile. The reasons for opposing the law were (1) It is discriminatory, (2) it is unconstitutional because a farmer should not be taxed in order to have the privilege of selling his produce, (3) it will do no good because an increase in consumption of apples will decrease consumption of other farm products, (4) the plan will fail since other fruit growers have advertised themselves into bankruptcy, and (5) licking and affixing the stamps is a nuisance. The new advertising law provides a tax of 1¢ per bushel on apples graded and packed, and 2¢ per hundred lbs. on apples sold in bulk. No tax is levied on bulk apples processed for juice or vinegar.

Massachusetts Farmers Make Big Advance in Soil Improvement. In a report issued by S. R. Parker, Executive Officer of the state AAA committee, the following items of soil improvement are noted on Massachusetts farms. 5,200 tons of superphosphate, 1,100 tons of potash, 23,000 tons of lime, and 8,000 tons of mulch were put into orchards, during 1938. Seedings were made as follows. 15,000 acres of clover and alfalfa, 32,000 acres of green manure crops, 682 acres of pasture, and 320 acres of winter legumes.

An Interpretation of the Nursery Inspection Law. Most growers are aware of the fact that action can be taken against owners of infested trees under Section 24 of the Nursery Inspection Law provided such trees are adjoining orchards and their infestation is liable to cause financial loss to the adjoining orchard. In a letter from R. H. Allen, Director of the Division of Plant Pest Control, this statement provides a needed interpretation. "The fact that the orchard is neglected is not reason enough for bringing such action. The law specifically states that an infestation must be present which is likely to cause financial loss to adjoining owners."

Do Poaches Ever Come True to Name From Pits? Answering this question in the Rural New Yorker, H. B. Tukey says, "There are no varieties of peaches which come true from the seed. Yet, there are some which come more nearly true than others. Some of the Crawfords do fairly well, as do also seedlings of Elberta. Still, one cannot count on what he will get when he plants out a peach pit."

REPORT ON THE PROGRESS OF THE WORK

The first part of the report deals with the general situation of the country. It is a very interesting and informative study of the country's progress in various fields. The second part of the report deals with the specific work done during the year. It is a very detailed and comprehensive account of the work done in various fields. The third part of the report deals with the conclusions drawn from the work. It is a very clear and concise summary of the work done.

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As a matter of fact, this is the way new varieties are produced and if they did not vary from the seed there would be no improvement in breeding."

Orchard Score Card Discussed by President Rice. At the August meeting of Associated Fruit Growers in Natick, President John E. Rice of the M.F.G.A. discussed the question of successful fruit culture. One of the generally accepted elastic percentages in fruit culture gives a rating of 30 points each for orchard care and marketing while 10 points each are assigned to location, soil, varieties, and harvesting. On this basis President Rice believes that a percentage of at least 80 is necessary for success, as follows: Care, 35 points, marketing, 33 points, and 3 points each for the other items mentioned above. If these latter items rate as low as 3 points, marketing and care must receive special attention. If you rate below 80%, President Rice sees no possibility of meeting expenses.

Is It To Be a Cull Market? The following paragraph is quoted from September Virginia Fruit. "If there are too many good and bad apples for the demand this year, which are you going to sell first? Think this over carefully. Some growers should go out behind the barn and have a frank talk with themselves. The answer only requires good common horse sense, but it requires just that. If the industry starts selling CULLS first it is likely to be a cull market throughout the season. Why not feed 20 per cent of your lowest grade to the hogs and start the season off by selling your better apples on a healthier market."

An Experiment on Lead Retention in Rats. In the July issue of the Journal of Nutrition there appears an article by Shields, Mitchell and Ruth of the University of Illinois on "The effect of apple constituents on the retention in growing rats of lead contained in spray residues." This statement is found under Conclusions, "There exists in the apple a substance or substances capable of depressing considerably the assimilability of lead. Under the conditions of this experiment the depression averaged 37%. Quite probably this depression in assimilability (retention in the body) relates to absorption from the intestinal tract only, and may be brought about by the pectic constituents of the apple."

A Storage Test with Apples Showing Internal Cork. Some storage men are of the opinion that apples showing internal cork improve in storage. To test this opinion, 10 bushels of corky apples are being used at the State College to measure this change if it exists, and to settle the issue one way or another. Part of the apples have been cut soon after harvest to determine the amount of cork present. A second lot was placed in common storage and a third lot in cold storage to be cut and examined later. A test is also being made of the content and quality of cider from corky apples.

A Promising New Material in Codling Moth Control. Several Massachusetts apple growers have reported rather serious damage from codling moth. As many as 10% of the apples showed "stings" in some orchards. In view of this situation the results of a test conducted by A. I. Bourne with a comparatively new material, are of much interest. In a Worcester County orchard one application resulted in a 4% infestation, two applications, 1.8%, while the regular lead arsenate application showed 12.6% and untreated trees 15%. These tests will be continued in 1940.

The first of these is the fact that the system is not self-sufficient. It is necessary to import a large quantity of raw materials and components from abroad. This is a serious disadvantage, especially in times of international tension.

Another disadvantage is the high cost of the system. The initial investment is very large, and the operating costs are also high. This makes it difficult for small businesses to adopt the system. However, the long-term benefits of the system, such as increased efficiency and reduced waste, may outweigh these initial costs.

Despite these disadvantages, the system has many advantages. It is a highly efficient and reliable system, and it can be adapted to a wide range of different applications. It is also a very flexible system, and it can be modified to meet the needs of different users.

The system is also very easy to use, and it requires very little training. This makes it a very attractive system for small businesses and individual users. The system is also very secure, and it can be used in a wide range of different environments.

In conclusion, the system is a very efficient and reliable system, and it has many advantages. It is a highly flexible system, and it can be adapted to a wide range of different applications. It is also a very easy to use, and it requires very little training.

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W. H. Thies
Extension Horticulturist

Further Evidence on the Value of Mulching

In one of our experimental orchards is a plot of 10 McIntosh trees that was cultivated without fertilizer for some 20 years. As would be expected, the cover crops were near failures, the soil became hard and the trees grew and yielded very poorly. It was even almost free of weeds. In 1938 a mulch of poor hay was applied at the rate of 4 to 5 tons per acre and this was repeated in 1939. An attempt was made to disc the mulch under in the spring of 1939 but this was not very successful because the soil was so compact and the mulch material not much decomposed. No fertilizer was applied.

It was expected that this treatment would result in a nitrogen depression and symptoms of nitrogen deficiency in the trees, but nothing of the sort has appeared. The trees grew well, the leaves were deep green and the plot produced a bumper crop this year, more than any other of the fertilized plots in the orchard, and this in spite of the fact that the trees average smaller. The heavy crop was doubtless due, in part, to favorable weather conditions during both 1938 and 1939, but it seems probable that the mulch had something to do with it.

The mulch doubtless favored penetration and retention of the rainfall, it may have favored air circulation between the atmosphere and the soil and it brought in some nitrogen that must have become available to the trees. Recent experiments have shown that tree root systems will not function effectively if the oxygen of the soil atmosphere falls below 10 percent, which is about one-half that of normal air. Low oxygen is characteristic of compact soils and this may be an important reason why such soils are not suited to orchards. These observations give added support to the idea that mulch is good stuff to have in the orchard.

J. K. Shaw

A Promising Red Gravenstein

About ten years ago a considerable number of possible bud sports of several varieties of apples were collected in orchards about the State and top grafted at the College. Among these were a half dozen or more from Gravenstein trees. Some of these proved to be similar if not identical with the regular Gravenstein. Others were somewhat better colored. One from the orchard of J. A. Whitcomb of Lunenburg appears to be outstanding. It seems equal to and may prove superior to the Red Gravenstein which has been in propagation for several years.

J. K. Shaw

THE UNIVERSITY OF CHICAGO
DEPARTMENT OF CHEMISTRY
RESEARCH REPORT

The following report was prepared by the student named [Name] under the supervision of the Professor named [Name]. The work was done during the semester ending [Date]. The title of the work is [Title]. The work was done in the laboratory of [Name]. The work was done in the Department of Chemistry, University of Chicago.

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Mulching Peach Trees

The practice of bringing mulch into orchards from outside is growing among Massachusetts apple growers. There is every reason to believe that the practice would be even more desirable for peach orchards. Peaches do not succeed in sod and cultivated peach orchards are just as likely to suffer from soil erosion as apple orchards. With new and better varieties covering nearly the entire peach season in sight, peach growing in Massachusetts for the local market should be profitable. Plant the trees on high sites where air drainage is good and mulch the trees if you can possibly secure the material at a reasonable cost.

J. K. Shaw

Discoloration of Apple Flesh

Since the Cortland variety is gaining favor for salad purposes, because it does not readily discolor after being cut, the question has been raised as to whether or not there may be other varieties having this same desirable characteristic. A single preliminary test of about 20 varieties indicates that Lobo and Golden Delicious may be fully as free from discoloration as is Cortland. Delicious, Macoun, Kendall and Milton were all better than McIntosh in this respect. Further tests are planned along this line.

A. P. French

A Borrowed Editorial, "The Man Who Sold Hot Dogs" (He might have sold apples). From "The Case Eagle," originally printed in "The Reporter."

There was a man who lived by the side of the road and he sold hot dogs. He was hard of hearing, so he had no radio. He had trouble with his eyes so he read no newspapers. But he sold good hot dogs. He put signs up on the highway, telling how good they were. He stood on the side of the road and cried, "Buy a hot dog, Mister?" and people bought. He increased his meat and bun order. He bought a bigger stove to take care of his trade. He finally got his son home from college to help him.

But then something happened. His son said, "Father, haven't you been listening to the radio? Haven't you been reading the newspapers? There's a big depression on. The European situation is terrible. The domestic situation is worse. Everything's going to pot." Whereupon the father thought, "Well, my son's been to college, he reads the papers, and he listens to the radio, and he ought to know." So the father cut down on his meat and bun orders, took down his advertising signs, and no longer bothered to stand out on the highway to sell his hot dogs. And his hot dog sales fell almost overnight. "You're right, son," the father said to the boy. "We certainly are in the middle of a great depression."

ITEMS FROM HERE AND THERE

F. S. C. C. Buys 250 Carloads of Apples. Fifty carloads of apples per week have been allotted to Massachusetts during the past five weeks as our share in the federal apple purchase program. Purchase Announcement #5 issued by R. D. Flato, in charge of the F. S. C. C. headquarters in Concord, Mass., contains this timely notice, "It has been deemed expedient to limit each grower to a maximum of three varieties in any one shipment, and a minimum of 50 packages for any one shipment. Growers are cautioned to observe this rule carefully." Prices, grades,

and varieties are announced each Saturday for the following week.

Fertilizer Bags for Mouse Concentration Stations. Bags placed near each tree early in the fall are being used very effectively in the orchard of Dr. Kemp in Shelburne to induce meadow mice to make easily located "runs" for the placing of poison bait. At this season there is a network of fresh "runs" beneath practically every bag. This greatly facilitates the mouse control program. On a recent sunny afternoon it was found that mice were eating the pieces of apple within a few minutes after they were placed in the run. With this set-up it should be possible to obtain almost 100% control of orchard mice. Other growers are using a forkful of hay near each tree as a concentration station.

Late Hanging McIntosh. Four McIntosh apples were found still clinging to a tree in an Acton orchard on November 2. This is quite a contrast to the early dropping observed in some orchards. An occasional apple left on the tree is apparently much less inclined to form an abscission layer than it is if competing with a lot of other apples. The above mentioned apples were of exceptionally fine color, and the quality was very good in spite of the unusual storage temperatures.

Conference on Internal Cork. A conference of interested horticulturists and pathologists from New England and the Hudson Valley is scheduled to be held in Hartford, Conn., December 11 to discuss the internal cork situation in orchards in the Northeast. At this meeting experimental work in the Hudson Valley will be presented by Dr. Burrell and recommendations for preventing internal cork in apples will be outlined. On droughty or shallow soils where a boron deficiency is likely to appear, the judicious use of borax tends to prevent internal cork.

New Materials for the Control of Aphids. Several highly promising materials are now available for use as a dormant spray in the control of aphids attacking fruit trees. A demonstration of two of these materials was conducted in the orchard of R. E. Huntley of Hanover last spring in cooperation with A. I. Bourne, Experiment Station Entomologist. Mr. Huntley is very much pleased with the results. Scale insects and aphid eggs were almost entirely eliminated on the test trees. He writes, "We feel that wherever a few aphid eggs hatched they were in a safe place where spray did not touch them, such as in the tops of high trees or in cracks and other concealed places. Practically complete control was found on sprayed trees while a count on unsprayed check trees showed 10-50 aphids per cluster of buds." These materials must be used while the trees are strictly dormant. Details of this new method may be obtained from Professor Bourne.

Folks Do Listen to the Radio. In response to a radio talk on "Why Some Home Fruit Plantings are Successful," given over the Colonial Network, October 27, during which publications on strawberries, raspberries, and grapes were mentioned, we have received 101 inquiries. This seems to indicate that folks not only listen to a discussion of agricultural matters over the radio, but that they occasionally write in for additional information.

Ten Years' Experiments with Codling Moth Bait Traps, Light Traps, and Trap Bands. This is the title of Bul. #253, published by the New Mexico College of Agriculture. The author, J. R. Eyræ, discusses in detail the effectiveness of a number

of materials and their influence on codling moth infestation. He says, "Although the fruit in baited and illuminated trees was often less wormy than that in neighboring unsprayed trees, the benefit was not so great as that obtained by spraying, or sufficiently pronounced to warrant at present the recommendation of bait or light trapping as a substitute for spraying. The work thus far, however, suggests that improvements and refinements both in the attractive materials and traps may increase the effectiveness of such appliances sufficiently to make them practical. Chemically treated bands will effectively destroy large numbers of overwintering larvae without injury to apple trees." More Massachusetts growers should use this method.

Planting a Young Orchard. Three publications on this subject have recently been received as follows. "Planting an Orchard," (Bul. #266) by A. K. Gardner and O. L. Wyman, University of Maine; "Establishing the Orchard," (Cir. #202) by T. J. Talbert, University of Missouri, and "The Planting and Early Care of the Apple Orchard," (Bul. #384) by J. Oskamp, Cornell University. All of these publications stress the importance of a good soil. In the Maine bulletin we read, "A deep, well-drained soil is the first essential in selecting the orchard site." The Missouri bulletin points out the need for good care while the trees are young, "The early life of the orchard is the most important. Trees neglected for a single season during this period may be ruined. On the other hand, good culture will bring earlier and more abundant harvests."

Preventing Soil Erosion. Missouri Research Bul. #280, "The Effect of the Degree of Slope and Rainfall Characteristics on Runoff and Soil Erosion," by J. H. Neal, suggests something of real importance in New England orchards, namely, the need of preventing surface runoff on sloping sites. Heavy mulching is one of the most effective means of encouraging the penetration of rain water and melting snow. In the above bulletin this statement is made. "If soil erosion is to be controlled, it is imperative that the surface of the soil is not left in a smooth condition during the season when rainfall of high intensities occur, since a soil in a bare, smooth, hard condition will erode considerably more than a similar soil in a rough condition. Vegetation has a decided influence in retarding erosion. By keeping the soil covered with vegetation, erosion can be reduced."

Baldwins in Demand. In the Nov. 6 issue of "The Special Apple Market Report," W. E. Piper says, "There is a relatively greater interest in Baldwins than in McIntosh this morning, reflecting trade demands for cooking apples. Baldwin prices are fully steady and in some quarters there are more sales around the dollar mark than heretofore." The fellow who, after the cold winter of 1934 said the Baldwin was completely out of the picture, has been very quiet this fall.

Canadian Government Buying Nova Scotia Apples. Quoting again from Piper's Apple Report, "The Government proposes to purchase 1,500,000 and possibly 1,750,000 bbls. of Nova Scotian apples of export varieties for diversion to processors for canning and drying. The 1939 Nova Scotian commercial apple crop is estimated at 2,169,000 bbls. The processed apples, the report states, are expected to move overseas to the Allied Nations." This will help to re-

lieve the serious situation which has developed in the Canadian apple industry which normally exports around 6,500,000 bushels (40 per cent) of the commercial apple crop to overseas markets.

Apples for Infants. "Fruit in the Young Child's Diet" is the title of an article in the October issue of "Parents' Magazine" which brings the story of the health and therapeutic values of apples and bananas to the 475,000 homes which receive this magazine. The article deals with the mineral and vitamin values of apples and recommends scraped raw apples for infants.

Plenty of Oranges in Florida. The indicated production of all oranges in Florida for the 1939-40 season is the largest on record for that State. But the prospective crop of California Navels and miscellaneous varieties is 2 percent below the 10-year (1928-37) average production and is 16 percent smaller than the crop of last season. Because of the delayed start of harvest in Florida and Texas and the smaller supplies of California summer varieties available this fall, market prices of citrus fruits have risen somewhat in recent weeks. The averages in mid-October were well above those of a year earlier. California Valencia oranges were almost \$1.00 per box higher than in mid-October 1938. Florida oranges were 75 to 90 cents per box higher than in October, 1938.

Competition Between Apples and Other Fruits at Retail in New York City. A preliminary report is now available of a detailed study of this subject by M. P. Rasmussen and F. A. Quitslund. Any reader of Fruit Notes who would like to examine this report may have that privilege by dropping a postcard to the writer. Among other things the report shows the annual sale of various fruits through fruit and vegetable stores in New York City as follows: Each figure represents a thousand pounds, Apples 50.8, Bananas 19.4, Oranges 59.4, Grapefruit 28.9, Pears 15.5.

Drinking Up the Surplus Fruit. In a recent issue of "Better Fruit" there appears an account of the experiences of G. L. Smith, a fruit grower in Rock Island, Illinois, in producing more than 10,000 gallons of cider per season. Imagine "Fresh, sweet, ice-cold apple juice in glass-lined tanks, without preservative." Mr. Smith has installed the very latest in cider making equipment. The fresh apple juice is run through a centrifuge at the rate of 150 gallons per hour to remove the bulk of the colloidal material. It is then flashed for 20 seconds at 180° by passing through 70 feet of half-inch tubing with temperature automatically controlled. The manufacture and sale of fruit products at this plant offers a real contrast to the ordinary farm cider mill. The above story will be loaned to anyone interested.

An Experiment with Color Stimulating Materials. In a recent issue of "Science News Letter" reference is made to the work of two American chemists who are looking for a chemical that will stimulate formation of the color pigment in apples. According to the report these men have discovered several compounds involving the thiocyanate ion which not only tend to intensify the color of naturally red apples but also induce a slight blush on yellow apples like Grimes Golden, which normally have little or no red color. Orchard spraying tests have been under way for 4 years.

1. The first part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862. It is a very important document, as it contains the President's views on the state of the Union and the progress of the war.

2. The second part of the document is a report from the Secretary of the War Department, dated January 10, 1862. It contains a detailed account of the military operations of the Army during the year 1861.

3. The third part of the document is a report from the Secretary of the Navy Department, dated January 10, 1862. It contains a detailed account of the naval operations of the Navy during the year 1861.

4. The fourth part of the document is a report from the Secretary of the Treasury Department, dated January 10, 1862. It contains a detailed account of the financial operations of the Government during the year 1861.

5. The fifth part of the document is a report from the Secretary of the Interior Department, dated January 10, 1862. It contains a detailed account of the operations of the Department during the year 1861.

6. The sixth part of the document is a report from the Secretary of the War Department, dated January 10, 1862. It contains a detailed account of the military operations of the Army during the year 1861.

W. H. Thies
Extension Horticulturist

The Feeding Value of Apples

One ton of dried apple pomace has about the same value in milk production as three tons of corn silage, according to the Virginia Agricultural Experiment Station. C. W. Holdaway says in October "Virginia Fruit," "Apples have more moisture than corn silage, and 100 pounds of apples will average about 11.88 pounds of digestible material while 100 pounds of corn silage (well matured corn) averages 18.7 pounds of digestible material. Therefore, apples of this moisture content (82%) would have 64% of the value of well matured corn silage for feeding purposes." These cash values given by the Virginia Station are of interest: When corn is worth 60 cents per bushel and corn silage \$3.98 per ton, apples (64% of value of corn silage) are worth \$2.55 per ton. On the same basis when corn is worth \$1.00 per bushel apples are considered worth \$4.25 per ton.

Hills (Vermont, 1901) considered that apples were worth about 40% as much as corn silage when fed to dairy cows. This rather low estimate may be due to the fact that apples contain a very low percentage of protein and in this experiment they were the sole roughage used, replacing corn silage pound for pound. It is possible that the solids that go into the cider have a higher value than the pomace solids. Investigators at the Washington Station fed 1.5 pounds per head daily to fattening lambs along with alfalfa hay and corn grain. They secured as good results as when the same weights of corn silage were fed in place of the apples. When a larger allowance of apples was fed results were less satisfactory.

Light Soils Show More Arsenic Toxicity.

Heavy applications of lead arsenate in some orchards in the Northwest have brought about such an accumulation of arsenic that the growth of cover crops is affected. But this condition is more likely to occur on light soils than on heavy soils. Writing in the Journal of Agricultural Research, A. S. Crafts says, "Heavy soils 'fix' large amounts of arsenic, rendering it unavailable to plants. Arsenic toxicity is high in light soils, especially in those low in colloids." And this suggests one more good reason for locating orchards on good soils, not necessarily the heaviest soils, but those which contain a fair amount of clay and silt. These soil constituents are far more valuable than most of us realize.

A New Slant on Old Varieties

About 70 years ago the American Pomological Society approved nearly 300 apple varieties as suitable for planting. Imagine a commercial apple orchard with even one-tenth that many varieties today. Of the many varieties described and exhibited, at least locally, more than nine-tenths have disappeared. Some of them got no farther on the road of fame than the back yard of the originator. Time has done a thorough job of weeding out until today we seldom plant more than half a dozen varieties and we see on the markets in commercial quantities not more than a dozen. Yet there are a number of deserving old-timers which ought not to go the way of the heath hen and the dodo bird.

An attempt is being made to preserve so far as possible in the State College orchard in Amherst, the varieties which originated in Massachusetts, and in addition any of the worthy old-timers known to the older generation. This matter is mentioned in Fruit Notes in the hope that a few more interesting old varieties may be added to the College collection through an offer of scions for top grafting. Following is a partial list of the varieties in which we are interested: Autumn Strawberry, Bottle Greening, Cathead, Congress, Delaware Red (Lawver), Dudley, Fall Harvey, Garden Royal, Gloria Mundi, Golden Pippin, Holden, Jacob Sweet, Lyscom, Martha Stripe, Nodhead (Jewett), Palmer Greening, Peck Pleasant, Walter Pease, Washington Strawberry. If you have a tree of any of these or of other good old varieties you will perform a service by dropping a postcard to the writer who will arrange to get scions next spring. You will be interested to know that more than 100 named varieties of apples have originated in Massachusetts. Among them are at least half a dozen well-known throughout the Northeast.

An exhibit of old-fashioned varieties is to be made at the Worcester meetings in January and here again readers of Fruit Notes can perform a valuable service. If you have good specimens of any old worthwhile variety which you care to exhibit, that information will also be of interest. For all we know, there may be among the almost forgotten old-timers a variety or two worthy of commercial planting today. Few of these old varieties were given a real test on a commercial basis, since they received little or no spraying and were not measured according to present day standards. Some of them became known as shy bearers. Maybe modern cultural practices would change that. We know that a vast number of varieties do not possess enough merit to be worthy of naming. On the other hand, it is a mistake to discard an old-timer and plant a relatively unknown newcomer until both are thoroughly compared. Maybe Martha Stripe or Gloria Mundi could hold its own with Milton or Gallia. Who knows?

The Fruit Outlook

A recent summary of the fruit situation by the U. S. Bureau of Agricultural Economics gives these facts and figures of interest to fruit growers.

1. The average combined production of all fruits during the next five years (1940-44) probably will be larger than the average for the five year period (1934-38).
2. Significant increases are expected for grapefruit, oranges, and lemons and moderate increases for peaches, pears, cherries, and grapes. The trend in apple production will probably continue downward at a moderate rate.
3. People are eating more fruit. Or stated in another way, increasing consumption tends to follow increasing production. Per capita consumption of fresh fruit increased from 131 pounds in 1919-23 to 150 pounds in 1934-38 and that of canned fruits from 9.3 to 15.4 pounds.
4. During the past few years, prices of grapefruit, oranges, cherries, pears, and dried prunes have decreased more than the prices of other fruits, particularly apples, strawberries, peaches, apricots, and plums.
5. The influence of consumer income on fruit prices in recent years has probably been of more importance than variations in supplies of fruit.

L. Southwick

Effect of Road Dust In Codling Moth Control

It is becoming quite apparent that ordinary road dust, complicates codling moth control in many roadside orchards. Wisconsin Bulletin 443, "What's New in Farm Science?" makes this suggestion, "When the fruit is dusty at spraying time it is almost impossible to wet it enough to make the spray stick. Instead, most of the spray collects in drops, somewhat like a sprinkle of rain on a dusty road,

and then runs off." Other investigators say that the larvae do not actually eat the skin of the apples they enter but rather discard that and begin feeding beneath the surface. Maybe the road dust offers further inducement to spit out the first mouthful.

Some Little Known Facts about Apple Scab

Question. What is the time interval between infection and appearance of early season scab spots? Answer. About 3 weeks during pre-pink stage to 8-10 days after mid-June.

Q. Over how long a period must the tree be wet before spore germination and leaf or fruit infection take place? A. From 15-18 hours at the low temperatures which usually prevail during pre-pink stage, to 6-8 hours during the summer (after mid-June).

Q. Are some leaves more susceptible to scab infection than others? A. Immature leaves are much more likely to become infected than fully formed leaves with well developed cuticle. Also, young, tender leaves are more susceptible than very young fruits of the same variety.

Q. Are scab spots slower in showing up on young fruits than on leaves? A. The former usually require 2-4 days longer than the latter and the older the fruit becomes, the longer is the wetting period required for infection and the longer it takes for scab spots to appear.

Q. How long a wetting period is required for scab infection on fruits during the summer? A. From 28-40 hours during the period late June to mid-August, according to artificial infection tests in the Hudson Valley.

Q. Is the time interval between infection and appearance of scab spots constant from season to season? A. No. In one season a rainy period of 44 hours in mid-August did not produce infection whereas 92 hours did (spots appearing 33 days later). In another season a rainy period of 40 hours (August 12) produced scab spots 62 days later while another inoculation followed by 76 hours of wet weather resulted in scab spots 39 days later. Hence the length of the wetting period late in the season determines whether or not the infection can occur, and also how soon the scab spots appear.

Q. What happens when McIntosh apples become infected with scab just before harvest? A. A September infection may not show up in cold storage until 6 or 7 months later.

Q. Does apple scab spread in storage? A. All attempts to cause scab to spread from diseased to sound fruits in storage have been unsuccessful.

O. C. Boyd

Apple and Pear Exports Curtailed

Importation of fresh apples and pears into the United Kingdom from the United States after November 20 was prohibited until further notice under an order issued by the Board of Trade on the 15th. Imports from Empire countries are to be permitted though arrangements are being made with the Canadian Government to limit the volume of apple shipments during the current season. Under the order produce despatched to the United Kingdom before November 20 is exempted from the prohibition.

Almonds, Filberts, and Pecans Plentiful

California almond production is estimated at 18,700 tons compared with 15,000 in 1938, and the 10-year (1928-37) average of 12,170 tons. Estimated filbert production in Oregon, the largest of record, is placed at 3,120 tons

compared with 1,860 tons in 1938. Estimated filbert production in Washington totals 590 tons compared with 380 tons in 1938. Total pecan production for the 1939 season is estimated at 60,474,000 pounds compared with 48,721,000 in 1938, and the 10-year (1928-37) average of 65,313,000 pounds.

Plenty of McIntosh for Holiday Trade

W. E. Piper reports more than 3,000,000 bushels of McIntosh in storage November 1 in New England and eastern New York. This compares with 1,651,000 bushels last year and 2,178,000 bushels in 1937. And if anyone runs short of apples, Canada can supply a few. More than 3,000,000 bushels are in cold storage in Canada and more than 7,000,000 in common storage this year compared with about 2,500,000 bushels in cold storage and 5,500,000 bushels in common storage last year.

An Apple Calendar

In the October "Consumers' Guide" there appears an interesting story entitled "Around the Consumers' Apple Year." It tells when the leading apple varieties go to market in largest quantities. Thirty-seven varieties are listed, ranging in season from Yellow Transparent to Yellow Newtown. The principal uses of each variety are indicated and the story closes with reference to a free booklet "Apple Recipes" which may be obtained from the Bureau of Home Economics, U. S. D. A., Washington, D. C. Apples are available in fresh form every month of the year except June. The statement is made that the farmer's share in the consumer's apple dollar seldom amounts to more than one-third and even in years of high prices farmers receive less than two-fifths.

Why Some Spray Programs Fail

Indiana Circular No. 241 tells "Why Some Growers Fail and Others Succeed with the Same Apple Spray Program." In the summary we read this statement, "Failure to control orchard insects and diseases is more often due to improper spraying methods and orchard management practices than to the inefficiency of the spray materials used." This statement is as true in Massachusetts as it is in Indiana.

Soil an Important Factor in the Strawberry Plantation

As early as 1691 the importance of a proper soil was recognized in the growing of strawberries. In a translation from the French Gardener of 1691, we read "The soil which they (strawberries) most affect, is rather a sandy than a stiff, and therefore you shall make choice of that part in your garden for them, which most approaches this mixture." The relative importance of various factors influencing profits in strawberry production is discussed in Michigan Technical Bulletin 162. The author, N. D. Peacock, says, "Character of the soil is a factor of first importance. A sandy or gravelly loam in good physical condition with abundant humus, moderately fertile and well drained, is considered to be the ideal soil for strawberry production."

Draining the Wet Spots

A very complete discussion of the farm drainage problem is found in Illinois Circular 493, "Its Maintenance and Construction." The authors, E. W. Lehmann and T. A. Pitzen, have prepared a 40 page publication, well illustrated, covering all phases of this question. Many fruit plantations in Mass. are on the ragged edge of profitableness because of a high water table during a part of the growing season. Growers desiring advice on either drainage or irrigation problems may obtain the services of W. C. Harrington of the State College staff.

Organic Matter Proves Effective in Preventing Surface Runoff

A paragraph from Nebraska Research Bulletin 112 is worth repeating, "Soil covered with straw or other organic material, gave an infiltration rate similar to or possibly higher than that obtained when protected by a dense growing crop. The total intake of water when the soil was thus protected was very great on all the soil types tested and the high rate of intake was maintained over an extended period. In fact it was sufficient to take care of an amount of water greater than that likely to be received during any rainy period in Nebraska." This statement bears directly on the use of mulch in our hillside orchards. Such orchards, heavily mulched, have a much better water supply because less of the rainfall flows down into the valley.

Sub-marginal Orchards Being Replaced in Washington

4500 acres of apple trees have gone out of production in the Wenatchee-Okanogan district within the past year. The total reduction over a 6-year period is about 6,000 acres. Among the orchards already pulled out or abandoned there are very few best areas. It is reported that these apple orchards are being replaced by soft fruits, including peaches, cherries and apricots, and in some cases general diversification and small sideline industries. Some of these abandoned areas had been planted by inexperienced growers, and given less than competent care and only a periodic watering. As a result they had drifted into an unprofitable condition.

"Water Supply for Orchards"

This publication, Cornell Extension Bulletin #367 by B. A. Jennings, covers the subject completely and is well illustrated. Here is one of the author's conclusions. "On many fruit farms more than one-half of the time of spraying is spent in travelling to and from the orchard and in filling the tank. A total of from 30 to 40 minutes is required if it takes from 10 to 15 minutes to travel to the water supply, 10 minutes to fill the tank, and from 10 to 15 minutes to return. A convenient water supply may save 20 minutes of this time. Twenty minutes saved for each tankful of spray applied means, if two men are spraying, the saving of 7 hours of man labor for each day of spraying. Also, from 4 to 6 more tankfuls of spray per day may be applied."

Cross Pollination of Great Importance

With planting time only a few months away, a thought or two about arrangement of varieties may be in order. Cornell Extension Bulletin No. 390, "Fruits Recommended for New York," contains this statement "An important cause of crop failure in New York orchards is the lack of cross pollination. In general, it can be said that all varieties fruit better in mixed plantings of two or more varieties than in plantings of one sort. McIntosh, Delicious and Northern Spy, because of their extreme self-unfruitfulness, need special provision for cross pollination. While most varieties serve as good sources of pollen, some do not. Among these are Baldwin, Rhode Island Greening, and Gravenstein."

Soil Color as an Indicator of Adaptability

J. Oskamp makes this pointed statement in Cornell Extension Bulletin No. 254, "Where drainage is reasonably rapid and free water stands hardly at all in the surface four feet of soil, the soil colors are rather uniform, usually

The first part of the report deals with the general situation of the country. It is a very interesting and informative study of the country's development. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's development.

The second part of the report deals with the economic situation of the country. It is a very interesting and informative study of the country's economic development. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's economic development.

The third part of the report deals with the social situation of the country. It is a very interesting and informative study of the country's social development. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's social development.

The fourth part of the report deals with the political situation of the country. It is a very interesting and informative study of the country's political development. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's political development.

The fifth part of the report deals with the future of the country. It is a very interesting and informative study of the country's future development. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's future development.

some shade of brown. In the upper subsoil there may be lighter colored layers and some slight mottling but on the whole there is reasonable uniformity of color and in general an absence of sharply defined changes for several feet in depth. Such soils are generally, although not always, light in texture and make ideal fruit soils."

Large U. S. Cranberry Crop.

Production of cranberries in 1939 in the United States is estimated at 668,000 barrels, compared with 475,700 barrels in 1938, and the ten-year average, 1928-1937, of 598,720 barrels. The increase in estimated production in Massachusetts over October 1 is partially offset by reductions in New Jersey, Washington, and Oregon. The crop this season is expected to be about 40 per cent larger than the 1938 crop, and 12 per cent larger than the ten-year average.

Mud Used in Cleft Grafting.

This is not a mud-slinging story but only a reference to the successful use of mud from a roadside puddle by John Geggatt of Acushnet in cleft grafting several young trees. Mr. Geggatt used the ordinary method of grafting with this extraordinary method of keeping the scions moist. The mud was merely packed around the scions and held in place with a piece of cloth. Of course, this method is not recommended, but it does show that with careful workmanship, grafting may be successfully done even with a seemingly hopeless material for keeping the wound moist.

Are Surface Applications of Potash Effective?

There is a general opinion among fruit growers supported by some investigational work that a broadcast application of potash fails to penetrate the soil to a depth of more than an inch or two and for that reason may become fixed before it is taken up by the tree roots. A recent report from the Northwest brings information of a new tool for making furrows through the orchard in which the fertilizer is placed. This insures a greater intake of both potash and phosphorus since it is brought nearer the roots and at the same time in a moist soil zone. There is reason to believe that the "tying up" of these elements is dependent to some extent upon the soil type. For this reason the furrow method of application may be more desirable in certain soil types. In contrast to this method a rather extensive experiment has been conducted in New Hampshire with broadcast applications of potash by Potter and Percival. Analyses of the soil and of leaf petioles were made to determine penetration and intake. The results are not very consistent. In one block however, there is rather clear evidence that a surface application penetrated to a depth of 6 or 8 inches.

Annual Spray Chart Revision Conference

The annual spray conference for revising the spray schedule for various tree fruits was held in Amherst November 21. This all day conference was attended by three members of the staff of the Waltham Field Station, members of the Departments of Pomology, Entomology, and Botany in Amherst and by some of the county agents. On the basis of this discussion the 1940 Spray Charts will go to the printer within a few days.

W. H. Thies
Extension Horticulturist

Oxygen Content of Soil Air Proves Important

The erratic and disappointing behavior of orchards on waterlogged or otherwise poorly aerated soils is partially explained by recent investigations in New York State. D. Boynton and W. Reuther have measured the seasonal variation of oxygen and carbon dioxide in three orchard soils of varying productive capacity. Measurements were made at depths of one to six feet over a period of twelve months. The results have been summarized in the 1938 Report of the American Society for Horticultural Science.

Previous studies have shown that apple tree roots fail to function normally as regards intake of mineral elements and water if the oxygen content of the soil air is less than 10%. And if it falls as low as 5%, roots are quite inactive. It appears from these studies that normal behavior of roots at any given level is limited by the oxygen content of the air in the soil spaces at that level. Furthermore, the efficiency of these roots is also influenced by the number of months of favorable soil aeration.

In any soil type the spaces or pores between the soil particles may be classified as capillary pores, which are small enough to serve in holding moisture, and non capillary, or larger pores, which facilitate the movement of gases in the soil. In a sandy loam soil this non capillary porosity was found to be about 16%, while in a silty clay it was only 1%. These differences are strikingly reflected in the oxygen content. For example, at a 6 foot depth in a sandy loam soil the oxygen content varied from about 14½% to 20% during the year, while in a silty clay loam below a depth of 3 feet it was less than 5% for a period of at least 6 months and was less than 10% for an additional 2 months. In the silty clay where the orchard has been relatively unproductive the oxygen content at a depth of 4 feet was above 5% for a period of only about 3 months during the summer. There are roots below that level but they must be in "gas storage" during the dormant season and part of the growing season even though rainfall is normal. From these studies it is believed that the critical range of non capillary porosity, from the standpoint of soil aeration, lies somewhere between 1% and 7%. These studies suggest that a waterlogged soil or an impervious soil may be unfavorable not alone because of faulty water relations but because the roots can't get enough oxygen.

Supplying the Nitrogen Needs of the Apple Tree

Speaking before one of the sessions of the M.F.G.A. in Worcester, J. R. Magness of the U.S.D.A. presented a clear-cut analysis of the nitrogen needs of an apple tree and made some recommendations for supplying them. A

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normal 25-year-old apple tree, according to the speaker, removes about $1\frac{1}{2}$ lbs. of nitrogen from the soil each year. This is divided as follows: Temporary removal through dropping blossoms and leaves, .69 lbs., and permanent removal through the fruit, seeds, wood, etc., .84 lbs. This latter item is sub-divided as follows: Fruit .23 lbs., seeds .1 lbs., wood .12 lbs., bark .09 lbs., and roots .3 lbs.

The performance of an apple tree in 1940 depends more on the nitrogen now stored in the tree than upon the amount we supply before bloom. There is a very heavy demand for nitrogen during the first few weeks after growth begins. The fruit and seeds contain almost as much nitrogen six weeks after bloom as they will contain at harvest time.

In a study of the effect of nitrogen on color the nitrogen content of leaves from 100 different trees has recently been analyzed and correlated with amount of color. Wherever the nitrogen content of leaves at harvest time was found to be $1\frac{1}{2}\%$ or less of dry weight, the color was good. If the nitrogen content of leaves at harvest time amounted to $2\frac{1}{2}\%$ of the dry weight the color was found to be about 25% less. This investigation demonstrates the need for providing plenty of nitrogen in the tree for use in spring without having an excess at harvest time.

From a practical standpoint the apple grower faces this problem. How can we get nitrogen in the tree for spring growth and still not have too much later in the season? In other sections of the country where fall applications do not predispose the tree to winter injury, such applications are ideal from the standpoint of color because they tend to insure a liberal supply in spring when it is most needed. Color has been found to be slightly better where nitrogen was applied in the fall. This practice is not recommended, however, in New England.

Under our conditions an early spring application of a readily available nitrogenous fertilizer, before the grass gets under way, is very nearly ideal. Such a practice results in less leaching than a fall application because the grass tends to pull the water out of the soil during spring and early summer about as fast as it falls. This is not so during the fall and winter when grass is not active. Thus a spring application is more economical because there is less leaching.

Under New England conditions an application of nitrogen which gives about 1 lb. of actual nitrogen to a 25-year-old tree is probably satisfactory except where the grass is heavy. We are interested, of course, in getting an adequate amount into the tree for use during the current season and the amount which the tree receives will depend both upon the earliness of application and the amount taken up by the grass.

In biennial bearing trees an application of fertilizer in the "off year" tends to build up the nitrogen reserve for use the following season. Less nitrogen is therefore needed in the spring of the "on year" and the fruit is almost certain to have better finish and better color because there will be less nitrogen in the tree at harvest time. There are some indications in New York State that a high nitrogen content in the tree in late summer is associated with dropping of McIntosh.

Some Ideas on Orchard Soil Management

Heavy mulching will promote growth and yield as well as, or better than, any commercial fertilizer. By a "heavy mulch" is meant enough hay, straw or similar materials to suppress the growth of grass and weeds during

most of the growing season. It is not entirely clear how heavy mulching increases growth and yield of orchard trees, but some possibilities may be suggested.

Mulch favors the absorption and retention of rainfall, thus contributing to a more adequate and constant water supply. It will absolutely prevent soil erosion. It tends to keep the surface of the soil more loose and open and favors air exchange, thus helping to keep up the oxygen supply in the soil. Recent investigations have shown that roots will not function if the oxygen in the soil air is reduced below one-half the normal percentage. As the mulch decays, mineral nutrients are added to the soil. It is quite possible that the presence of liberal amounts of organic matter and humus helps to keep mineral nutrients in available form and prevents them from being fixed in unavailable form.

Mulching is most advisable (1) where there is a convenient and cheap source of material, (2) on comparatively steep slopes, (3) on rough, stony land, (4) on loose, gravelly soils likely to suffer from lack of water during dry periods, (5) on varieties apt to drop heavily near harvest time, and (6) where root injury from cold is feared. The possible objections are: (1) cost, (2) danger of fire, and (3) danger of injury from mice.

Few if any mature orchards can produce enough material between the trees to be effective as a mulch. The usual source is waste hay, the supply of which is almost nowhere adequate. The question arises as to whether it would pay to purposely grow mulch outside the orchard. It is my belief that a fruit grower can afford a cost up to \$10.00 per ton and that under favorable conditions the growing of mulching material outside the orchard is likely to be economically profitable.

For nearly twenty years the Massachusetts Experiment Station has been carrying on experiments in orchard soil management and fertilization. On the basis of results from these and other experiments and from observations of orchards, certain statements bearing on orchard practice may be made. Soils and other factors of management vary so greatly that these statements may not apply in all orchards. Particularly, direct benefits in yield from the addition of potash to nitrogen may not be always obtained.

Fruit trees grown in sod will not continue to make satisfactory growth and produce good crops without added nitrogen. Fruit trees under cultivation may grow and produce well for several years without fertilizer applications, if on a naturally fertile soil. Liberal fertilization with nitrogen alone will stimulate growth and production for 5 to 10 years, after which production is not sustained. Potash added to nitrogen will sustain production better than nitrogen alone.

We have as yet no evidence that phosphorus added to nitrogen and potash will directly increase yields. Phosphorus, however, is essential to good growth of cover crops, thus increasing the organic matter which may increase orchard yields.

J. K. Shaw

Suggestions for the Care of Power Sprayers

During the winter months sprayers should be overhauled in order that they may be in good working condition when the spraying season arrives. Some of the items which should be checked over are listed below:

1. Sprayers should be overhauled annually.

2. Valves, plungers, bearings, gears, drive chains, etc., should be examined and worn or broken parts replaced.
3. Check pump. Replace valve seats and balls if worn and pitted. Replace pump cylinders if badly worn. When taking pump apart mark bearing caps so that they may be replaced in same position as they were originally. Repack plunger if necessary.
4. Check pressure regulator. Check valve seat and ball. Check setting of stem below the ball. There should be 1/16" clearance when pressure is off. Replace packing around stem. Oil spring, adjustment nuts and all moving parts.
5. Check engine. Remove carbon, grind valves, adjust tappets, take up bearings, clean or replace spark plugs. Have magneto checked by authorized service station if necessary. If piston rings are badly worn replace or have cylinders re honed if oversized rings are needed.
6. Replace pipes which have become very rusty on the inside.
7. Make sure that strainers are in good condition.
8. Be sure that drive belts and chains are in proper alignment.
9. Grease agitator bearings with water pump grease.
10. Check spray nozzles to make sure that they are in proper working order.
11. Be sure that hose is properly rinsed out with clear water, drained and coiled. Store in dry location away from artificial heat and sunlight.
12. Grease or paint all metal parts that are likely to rust.
13. Order extra parts such as nozzles, discs, etc., which may be needed during the spraying season.

O. C. Roberts

Hormones and the Dropping of Fruit

There is considerable popular interest in hormones at the present time with a tendency on the part of many to believe that Utopia for agriculture can be reached via the mysterious hormone route. This belief is based on the tremendous progress made in the past few years concerning the nature of hormones and their manifestly universal presence and importance wherever life exists.

Plant growth substances, variously called growth hormones, growth regulators, growth enzymes, phytohormones and auxins, are definitely known to occur in plants in very minute quantities. In fact, they are essential for normal cell enlargement and recently have been shown to influence fruiting processes. Further, it has been found that the substances which are essential for the growth of plant parts above the ground often inhibit root

growth. The mechanism by which hormones "activate" growth is not well understood at the present time.

But what has this to do with the dropping of fruit? Many fruit growers have heard of investigations regarding the use of hormones to prevent pre-harvest dropping. Scientists at the U.S. Horticultural Station at Beltsville, Maryland, have found that many plant substances have the faculty of delaying normal abscission (dropping) of various plant organs including flowers, stems, petioles and even maturing apples. Recently, with several varieties, very low concentrations of growth substances applied as late sprays noticeably lessened the fruit drop. Other limited tests suggest the same result. We conducted similar tests this fall in two of our McIntosh blocks in Amherst. In one case, the results seemed favorable but, in the other, they were inconclusive. It is just possible that we used too weak a concentration (.0005%) and perhaps the material used (naphthalene acetamide) was applied a little late. However, on the basis of results to date, we believe his new method should be followed with not more than a moderate enthusiasm by most growers until more is known concerning its possibilities.

Probably additional data on this subject will be forthcoming during the next few months. Further, next season we plan to carry on more extended experiments here at Massachusetts State College. If growers wish to try out hormone spraying on a small scale, a good plan to follow is to select trees of the same age, with similar vigor and crop and leave alternate trees in a row, for example, as check (untreated) trees. Otherwise comparisons of any value will be difficult to make. (Additional information on these new materials will appear in the next issue of Fruit Notes.)

L. Southwick

A New Orchard Account Book

Have you ever wished for a simple, usable record book in which to keep account of Receipts and Expenditures, Inventory, and Profits, if any? Well, your wish is granted. R. E. Moser of the State College staff has prepared such a record book, and copies will be sent to interested Massachusetts fruit growers as long as the supply lasts. A postcard will bring one by return mail. While designed primarily for fruit growers, there is also space to keep account of secondary farm enterprises.

New F.S.C.C. Program Starts January 9

With heavy stocks of the McIntosh variety in storage in the Northeast, the F.S.C.C. will begin the purchase of this one variety from Massachusetts storages on January 9 for distribution among families on welfare. Interested growers should contact the county agricultural agent or a member of the county committee. During the fall purchase program, 33 different varieties were offered to the F.S.C.C. in Massachusetts.

ITEMS FROM HERE AND THERE

Missouri Takes Drastic Steps in Apple Marketing. During the past year the Missouri Legislature passed an act requiring grade markings on all packages of apples. This in itself isn't out of the ordinary but the act also re-

quires all growers whose fruit fails to make an established grade to place the designation "CULLS" conspicuously on the packages. The same label must appear on fruit delivered in bulk on trucks and also in the piles of fruit when offered for sale. The letters must be at least $2\frac{1}{2}$ inches high.

Precooling Brings Striking Results in Indiana. Twenty-two carloads of strawberries and 19 carloads of peaches were included in a precooling test in Indiana last season. Precooling the top layer of a carload of strawberries to approximately 45° F. prevented the development of rot in transit and resulted in higher returns to the shipper than from fruit not precooled. Brown rot development in the top layers of peaches was definitely checked during transit by precooling to less than 50° F. before shipment.

The Strawberry Outlook. About 197,000 acres of strawberries will be ready for harvest in 1940. This acreage is the largest since 1929 and 9% above the 10-year average 1928-37, but is only about 2% larger than the 1939 harvested acreage. Should yields in 1940 be average, production will be somewhat less than in 1939 when the per acreage yield was about 10% above average.

Five States Produce U.S. Cranberry Crop. Cranberry growing is concentrated in five states, Massachusetts, New Jersey, Wisconsin, Washington, and Oregon, where 671,000 barrels were harvested last fall. The crops in both Massachusetts and Wisconsin were well above average as a result of favorable growing conditions. The Massachusetts crop was 43% larger than the light crop of 1938.

Canada Diverts Surplus Apples into By-products. In spite of a preferential market in the United Kingdom, Canada will have much difficulty moving a normal volume of fresh apples to overseas markets this season. As a result the Canadian Government is now diverting into canning and drying 5,000,000 bushels or more. During the last several years the canned and dried products have averaged only a little more than 1,000,000 bushels. The increased supply this year will mean more competition for canned and dried apples intended for export from the United States.

Record Crop of Pears Produced in Wenatchee. Frank Nelson of Wenatchee, Washington, has set a high mark in pear production this season. In a block of 110 trees of the Bartlett variety he picked an average of 604 pounds per tree. The trees are planted 18 feet apart, making about 134 per acre. This means a production of slightly over 40 tons of pears per acre.

Weight of Apples in Different Containers. A few days ago a class in pomology at the State College was given the assignment of finding the relative weights of Cortland apples in various types of packages. The net weights were as follows: Crate - jumble pack with bulge, 45 lbs. Crate - face and fill, 42 lbs. Crate - level pack, jumble, 39 lbs. Basket - $40\frac{3}{4}$ lbs. Eastern Box - layer packed, 33 lbs. Gaylord Carton - jumble pack, 43 lbs. 96 Apple Carton - $36\frac{1}{2}$ lbs. These figures indicate that there is not as much difference in net weight of apples in the more common packages as is commonly believed. It will be noted that a crate with a bulge contains 6 lbs. more than one that is packed level, as was originally intended.

Decrease in Apple Tree Numbers. On January 1, 1935 there were about 100,000,000 apple trees of all ages in the U. S. This is less than 1/2 the number reported in 1910 and about 14% less than the number reported in 1930. Because of a decided increase in yield per bearing tree in commercial orchards production has declined only 8% since 1920 while tree numbers have declined 28%. Much of this decline has taken place in farm orchards.

Detailed Costs of Removing an Old Orchard. A detailed record is available of the costs involved in removing 9 acres of 37-year-old apple orchard in Bedford, Ind. After the trees were removed the land was limed, fertilized, reseeded and replanted. Any grower interested in the cost of each item involved in these various operations may obtain the details by dropping a card to the writer. The cost per acre of tree removal amounted to about \$26.00.

Apple Superstitions. Throughout the world the apple looms large in superstition. In Serbia if a maiden accepts an apple from her lover she is engaged. Superstitious Greeks believe that if the bride and bridegroom eat an apple together it will insure harmony in marriage. Throughout the world it is believed that a bride can tell the future by cutting an apple. If the seeds are an even number she will be happy, if odd, unlucky. The Zulu, who isn't familiar with the apple, chews a piece of wood in the belief that this will soften the heart of the woman he wants to wed. Possibly that's where the eating of a Ben Davis originated.

Peat Aids Young Trees in Heavy Soils. A mixture of granulated peat and soil around the roots of young trees has resulted in better growth the first season on a heavy soil at Geneva, New York. Both root and top growth of newly planted trees were improved according to H. B. Tukey and his associates at the Geneva Agricultural Experiment Station. It is thought that the increased growth may be due to better contact of roots with the soil immediately after planting, improved aeration in early season favoring rapid root development, easier penetration of rainfall to area occupied by the roots, and easier penetration of roots into the peat-soil mixture."

New Protector Saves Eyes in Spraying. Continuous clear vision in spraying is accomplished by a new patented device described in "Better Fruit." A 10-yard roll of transparent, water-proof material is guided and supported by the same flanges which hold the visor. Whenever the material becomes smudged, the operator pulls it to the right, depresses a clip and tears off the smudged part, thus restoring clear vision instantly.

Increase in Texas Apple Consumption. The effect of advertising of apples in Texas is rather strikingly illustrated by the following figures: During the period of 1928-1935 when no advertising was carried on, a total of 1632 cars were sold in the state. From 1936-1938, the first two years of advertising, 1812 cars were sold. In 1938, the third year of advertising, sales amounted to 1860 cars.

New Type of Orchard Heater. A new heating principle will be tested out at a field laboratory in Riverside, California, this winter. In a new type of

oil burner, equipped with a special combustion chamber, 30% of the gas resulting from the combustion of the fuel is returned to the burner. It is hoped that this new arrangement will make possible more complete, and therefore more efficient burning of the oil.

Apples Instead of Christmas Cards. Frank Hubbard, a Washington apple grower, has proposed a novel idea for distribution of apples at Christmas time. "Everyone sends Christmas cards," said Hubbard, "Why not use apples instead of cards?" So he ordered 300 cardboard boxes large enough to hold a single large apple. These were sent to 300 of his friends and summertime customers. Dave Rubinoff, the violinist, purchased 200 gift boxes of apples when he visited the Wenatchee Valley before the holidays.

Record Price for a Bushel of Apples. Imagine selling one bushel of apples for \$108.00. That is the price paid at auction by one of the large chain stores a few weeks ago for the best bushel of apples in the State Apple Show in Grand Rapids, Michigan. These apples were of the Turley variety and were grown in the Heiser Orchard at Hartford, Mich. The highest price previously paid for a bushel at this Show under similar circumstances was \$25.00.

"Pruning Devitalizes Trees." This is the title of an article in December Better Fruit by P. T. Harvey. Referring to heavy pruning, he says, "The most prevalent belief among growers is that pruning stimulates growth. It does to a certain extent, but if on normal trees you weigh the prunings and compare that with the new growth, you will find that the growth is not equal to what is cut off. I have never been able to understand why many apple growers insist on cutting off the tops of their trees thereby making brush piles of them. An apple tree has a tendency to grow tall but if it is not cut off, the weight of the fruit will gradually shape the fruit into a weeping-willow formation and on these long bending limbs will be found the best fruit that grows."

Fertilizer and Labor Costs Compared. Circular 383 of the New Jersey Agricultural Experiment Station makes this interesting statement, "Excepting the years 1931 and 1932, fertilizer can probably be bought today at about as low a figure as at any time since the World War, whereas the price of labor is still high. Thus, fertilizers judiciously used to increase per acre yields may actually cut the labor cost." If a dollar's worth of fertilizer is the thing needed to produce two dollar's worth of fruit, that investment will reduce the per unit cost and will help to offset the labor item.

Application of Borax Prevents Internal Cork. Outstanding success in the prevention of internal cork in the Champlain Valley was reported by A. B. Burrell at one of the recent N.F.G.A. sessions in Worcester. Results of these tests will be reported in the next issue of Fruit Notes along with detailed directions for applying borax on trees of different ages. Every Massachusetts grower who had any internal cork in McIntosh, Cortland or other varieties last fall should take steps this spring to prevent its recurrence. A small amount of borax provides the necessary magic which insures normal fruit.



